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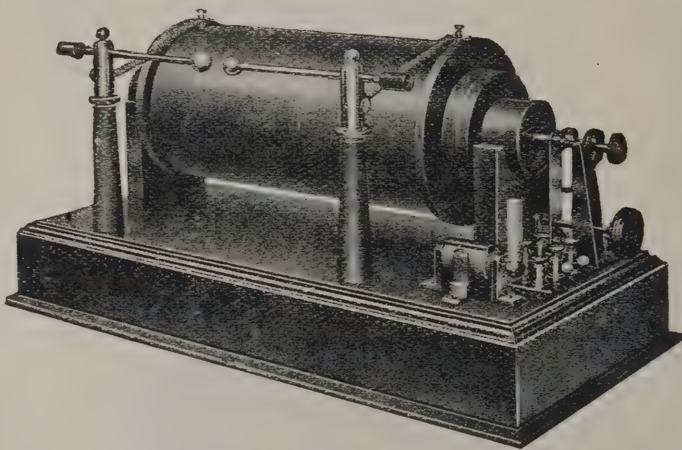

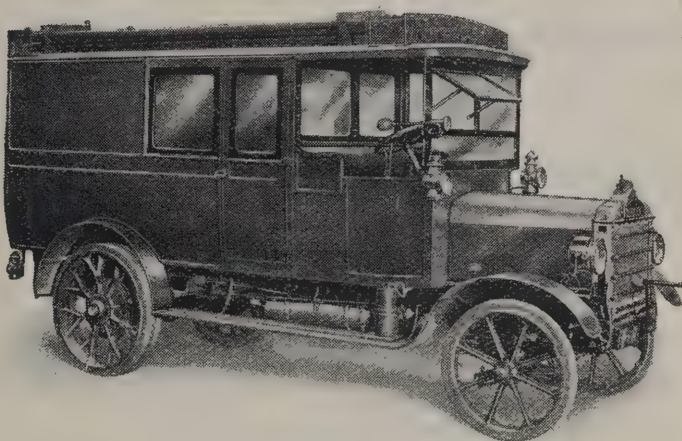

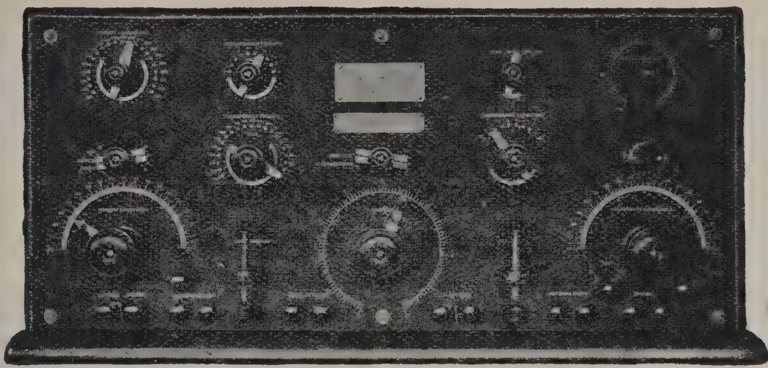

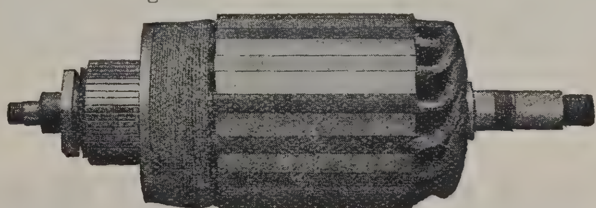

The Year-Book *of* Wireless Telegraphy & Telephony · 1917

Marconi House, Strand, London, W.C.

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PREFACE

THE first YEAR BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY came out in 1913, and we are therefore now making our FIFTH ANNUAL APPEARANCE. It has been exceedingly gratifying to us to find that, from the start, we correctly gauged the requirements of our readers, so that our successive issues have developed along the lines of instituting improvements in the various sections of the volumes, rather than of introducing any drastic reconstruction. The spontaneously expressed opinion of a gentleman, whose practical experience of certain phases of wireless telegraphy is perhaps unique, when, in the course of answering an enquiry relating to our present edition, he stated that the "YEAR BOOK improves regularly on each appearance," is, therefore, especially gratifying to the Editor.

The "incurable habit of progress," which we in last year's preface attributed to radiotelegraphy and telephony, has manifested itself as plainly as ever during the last twelve months. We have consequently found it necessary, in view of the added pressure on our space and the lessened supplies of paper available, to utilise a slightly smaller type for some of our matter. We claim, nevertheless, to have carried this out without any sacrifice of easy legibility and comfortable *format*. It will be noted that, despite our expansion to 928 pages, we have not increased the cost of the volume to our subscribers.

A number of British Dependencies and foreign countries have amended their LAWS AND REGULATIONS relating to wireless telegraphy, and the subject matter of this section has accordingly been carefully revised and brought up to date.

In our 1916 issue we availed ourselves of the labours of the Committee on Standardisation of the American Institute of Radio Engineers, and printed the definitions of terms as set forth by them, in addition to a glossary of terms as current in Great Britain. For the present volume we enlisted the services of Dr. J. Erskine Murray, who has unified and revised the two glossaries; thereby producing a TABLE OF DEFINITIONS, which we trust will find acceptation on both sides of the Atlantic. The same eminent technical authority has also carried out a revision of the useful formulæ, data and tables, which have proved of so much utility to our readers in the past.

It will be easily understood that questions of public policy have affected the completeness of our reference section, devoted to call

letters, and other particulars relating to LAND AND SHIP STATIONS. Our readers will, however, find that the information as set forth in our present pages is thoroughly reliable, and has been, as far as possible, brought up to date.

The high standard set in our former issues for the ORIGINAL ARTICLES, specially written for the YEAR BOOK, has been fully maintained. Several of them possess special interest for American readers, notably the summary of Judge Mayer's patent decision, promulgated in New York in 1916, which brought to a final settlement the long-outstanding controversy on the subject of the relationship between the "Fleming Valve and De Forest Audion." Prominent writers like Mr. Alfred Noyes have contributed articles of general interest, whilst leading technical authorities like Dr. Fleming, Dr. Eccles, Professor Howe and Professor Marchant have dealt with subjects which they have made pre-eminently their own. Perhaps we may be allowed to direct special attention to an informative description of the "American Long Distance Marconi Stations," which has been specially contributed by Mr. C. H. Taylor, whose practical experience enables him to write with unique authority upon the subject.

The WIRELESS MAP OF THE WORLD inserted in the present volume has been enlarged into a duplicated Mercator, showing Australia and the Far East as reached both by the Eastern and Western routes. Those who consult it are thus enabled to fully appreciate the expanse of the Pacific Ocean, which has, through the recent opening of long-distance stations in the Hawaïan Islands and Japan, been bridged by wireless telegraphy. We have, moreover, introduced the innovation of indicating in red the stations which are open for ship-and-shore communication.

OUR ILLUSTRATIONS have been arranged in symmetrical order, a fact which will appear in the list given on page lvii. We feel sure that many readers will be considerably interested in comparing the historic apparatus, such as those shown opposite pages 32, 48, and 64, with modern machinery like that opposite pages 208 and 224, and the recently designed types of field and aircraft wireless sets opposite pages 128, 144, 160, and 176. Our portrait gallery would in itself constitute a testimony to the world-wide development of Wireless Telegraphy.

THE EDITOR.

MARCONI HOUSE, STRAND.

1st *April*, 1917.

Frontispiece.]

U.S.A. PACIFIC LONG-DISTANCE STATION.

AT BOLINAS (CALIFORNIA). THE TRANSMITTING STATION OF THE MARCONI TRANS-PACIFIC LINK BETWEEN AMERICA AND JAPAN. A REAR-END VIEW OF THE MAST-LINE.

JANUARY, 1917

1	M	Prof. Hertz died, 1894. Ship messages accepted at British post offices, 1905.
2	T	Capitulation of Port Arthur, 1905.
3	W	
4	Th	
5	F	
6	S	**Epiphany.** Twelfth day.
7	**S**	**1st Sunday after Epiphany**
8	M	
9	T	International Conference for Safety of Life at Sea closed, 1914.
10	W	British Penny Postage established, 1840.
11	Th	
12	F	HILARY LAW SITTINGS BEGIN.
13	S	
14	**S**	**2nd Sunday after Epiphany** Duke of Clarence died 1892.
15	M	Sandwich Islands discovered, 1778.
16	T	
17	W	Benjamin Franklin born, 1706; died, April 17th, 1790.
18	Th	Captain Scott reached S. Pole, 1912.
19	F	"Princesse Clémentine" ran ashore. News wirelessed to Ostend, 1901.
20	S	"Safety of Life at Sea" Convention signed at London, 1914.
21	**S**	**3rd Sunday after Epiphany**
22	M	Accession of Edward VII., 1901.
23	T	"Republic" wrecked, 1909. Passengers and crew saved.
24	W	Naval Battle off Dogger Bank, 1915.
25	Th	
26	F	
27	S	William II., Emperor of Germany, born 1859.
28	**S**	**4th Sunday after Epiphany** Röntgen Rays discovered, 1896.
29	M	Capitulation of Paris, 1871.
30	T	Anglo-Japanese Treaty signed, 1902.
31	W	"Great Eastern" steamer launched, 1858.

FEBRUARY, 1917

1	Th	**Candlemas**
2	F	Mr. Marconi lectured on wireless before the Royal Institution, 1900.
3	S	Telegraphs transferred to Government, 1870.
4	**S**	**Septuagesima Sunday**
5	M	Thomas Carlyle died, 1881.
6	T	
7	W	
8	Th	War between Japan and Russia began, 1904.
9	F	First Australian Commonwealth wireless station opened 1912.
10	S	Queen Victoria married, 1840.
11	**S**	**Sexagesima Sunday** Thomas Alva Edison born, 1847.
12	M	
13	T	
14	W	
15	Th	Sir Wm. Preece born, 1834; died, November 6th, 1913.
16	F	
17	S	
18	**S**	**Quinquagesima** German submarine blockade instituted, 1915.
19	M	Alessandro Volta born, 1745; died, March 5th, 1827.
20	T	Shrove Tuesday. Panama-Pacific Exhibition at San Francisco opened from Washington by wireless, 1915.
21	W	**Ash Wednesday** Validity of "Four Sevens" Patent upheld by Justice Parker, 1911.
22	Th	Prof. H. Hertz born, 1857; died, January 1st, 1894.
23	F	Johann Karl Friedrich died, 1855; born April 30th, 1777.
24	S	Mr. Marconi lectured on "The Commercial Application of Wireless Telegraphy" at Liverpool, 1908.
25	**S**	**1st Sunday in Lent.**
26	M	C.G.C. "La Provence" sunk in Mediterranean, 1916. 870 persons saved.
27	T	P. & O. "Maloja" mined and sunk off Dover, 1916.
28	W	

MARCH, 1917

1	Th	Wireless Service inaugurated between Hawaiian Islands, 1901.
2	F	Mr. Marconi lectured on Wireless Telegraphy before Institution of Electrical Engineers, 1899.
3	S	Dr. Alexander Graham Bell born, 1847.
4	S	**2nd Sunday in Lent** Inauguration Day, U.A.S.
5	M	Frederick Anthony Mesmer died, 1815. Alessandro Volta died, 1827 ; born, February 19th, 1745.
6	T	
7	W	
8	Th	
9	F	
10	S	
11	S	**3rd Sunday in Lent**
12	M	Wireless meteorological messages first transmitted from Macquarie Island, 1912.
13	T	
14	W	Millwall Docks opened, 1868.
15	Th	
16	F	Georg Simon Ohm born, 1787 ; died, July 7th, 1854.
17	S	St. Patrick's Day.
18	S	**4th Sunday in Lent** Grover Cleveland born, 1837.
19	M	
20	T	Sir Isaac Newton died, 1727 ; born, December 25th (O.S.), 1642.
21	W	Vernal Equinox.
22	Th	
23	F	
24	S	H.M.S. " Eurydice " foundered, 1878.
25	S	**Passion Sunday.** Lady Day.
26	M	
27	T	English Channel spanned by wireless, 1899.
28	W	
29	Th	
30	F	First Transatlantic marconigram published in *The Times*, 1903.
31	S	Robert Wilhelm Bunsen born, 1811 ; died, August 16th, 1899.

APRIL, 1917

1	S	**Palm Sunday** Bismarck born, 1815; died, July 30th, 1898.
2	M	
3	T	
4	W	
5	Th	First licence granted for erection of Italian high-power station, 1903.
6	F	**Good Friday** Prof. Adolf Slaby died, 1913; born, 1850. Commander Peary reached North Pole, 1909.
7	S	
8	S	**Easter Day** Anglo-French Convention signed, 1904.
9	M	**Easter Monday**
10	T	**Easter Tuesday**
11	W	American Civil War began, 1861. HILARY LAW SITTINGS END.
12	Th	Albert Medal (Roy. Soc. of Arts) presented to Senatore G. Marconi, 1914.
13	F	
14	S	President Lincoln assassinated, 1865.
15	S	**Low Sunday** "Titanic" disaster, 1912; over 700 lives saved.
16	M	
17	T	Mr. Marconi lectured on "Progress of Wireless Telegraphy," before New York Electrical Society, 1912.
18	W	
19	Th	Byron died, 1824.
20	F	
21	S	
22	S	**2nd Sunday after Easter**
23	M	S. GEORGE'S DAY.
24	T	French Marconi Company formed, 1903.
25	W	Senatore G. Marconi, G.C.V.O., born 1874. Marconi International Marine Communication Co., Ltd., formed, 1900.
26	Th	"Four Sevens" Patent granted, 1900.
27	F	Samuel F. B. Morse born, 1791; died, 1872.
28	S	"Bounty" Mutiny, 1789.
29	S	**3rd Sunday after Easter**
30	M	Johann Karl Friedrich born, 1777; died, February 23rd, 1855.

MAY, 1917

1	T	Wireless Telegraph Service between Italy and Spain inaugurated, 1915.
2	W	
3	Th	Jamaica discovered, 1494.
4	F	
5	S	Napoleon I. died, 1821; born August 15th, 1769.
6	S	**4th Sunday after Easter** ACCESSION OF KING GEORGE V., 1910.
7	M	S.s. "Lusitania" torpedoed, 1915.
8	T	Eruption at Martinique, 1902.
9	W	
10	Th	Imperial Institute, London, opened, 1893.
11	F	
12	S	Windhuk wireless station captured, 1915.
13	S	**Rogation Sunday** Wireless communication established over a distance of eight miles, 1897. Joseph Henry died, 1878; born December 17th, 1797.
14	M	
15	T	Mr. Marconi lectured on "Syntonic Wireless Telegraphy" before Royal Society of Arts, 1901.
16	W	
17	Th	**Ascension Day**
18	F	New Eddystone Lighthouse opened, 1882.
19	S	Czar of Russia born, 1868.
20	S	**Sunday after Ascension** Christopher Columbus died, 1506.
21	M	"Lake Champlain," first British merchant vessel equipped with wireless, 1901.
22	T	
23	W	Italy declared war on Austria-Hungary, 1915.
24	Th	EMPIRE DAY. Queen Victoria born, 1819. EASTER SITTINGS END.
25	F	Lloyd's Incorporated, 1871.
26	S	Queen Mary born, 1867.
27	S	**Whit Sunday**
28	M	**Whit Monday**
29	T	**Whit Tuesday** "Empress of Ireland" disaster, 1914; 541 lives saved.
30	W	Decoration Day, U.S.A.
31	Th	Great Naval Battle off Jutland, 1916

JUNE, 1917

1	F	
2	S	First British Wireless Patent application lodged, 1896. Mr. Marconi lectured on "Radiotelegraphy" before Royal Institution, 1911.
3	**S**	**Trinity Sunday** KING GEORGE V. BORN, 1865. Lord Kelvin sent first paid Marconigram, 1898.
4	M	International Radiotelegraphic Conference opened, London, 1912.
5	T	
6	W	Earl Kitchener drowned, 1916. TRINITY LAW SITTINGS BEGIN. Radiotelegraph Act of Canada passed, 1913.
7	Th	Corpus Christi. Union of Sweden and Norway dissolved, 1905
8	F	
9	S	Charles Dickens died, 1870.
10	**S**	**1st Sunday after Trinity** S.s. "Slavonia" stranded off Azores, 1909. Passengers and crew saved.
11	M	
12	T	Sir Oliver Lodge born, 1851.
13	W	Mr. Marconi lectured before Royal Institution on "Progress of Electric Space Telegraphy," 1902.
14	Th	Flag Day, U.S.A.
15	F	Magna Charta, 1215.
16	S	
17	**S**	**2nd Sunday after Trinity** Sir W. Crookes born, 1832.
18	M	War with U.S.A., 1812. Waterloo, 1815.
19	T	"Alabama" sunk by "Kearsage," 1864.
20	W	
21	Th	
22	F	Summer Solstice.
23	S	H.R.H. Prince of Wales born, 1894.
24	**S**	**3rd Sunday after Trinity** MIDSUMMER DAY.
25	M	
26	T	Lord Kelvin born, 1824; died December 17th, 1907.
27	W	
28	Th	Assassination of Archduke Francis Ferdinand at Sarajevo, 1914.
29	F	Rubens born, 1577.
30	S	Tower Bridge opened, 1894.

JULY, 1917

1	S	**4th Sunday after Trinity**
2	M	
3	T	Sadowa, 1866.
4	W	Contract between Marconi Co. and Admiralty made for equipment of ship and shore stations, 1900.
5	Th	International Radiotelegraphic Convention signed London, 1912.
6	F	
7	S	Georg Simon Ohm died, 1854; born March 16th, 1787.
8	S	**5th Sunday after Trinity**
9	M	Conquest of German S.W. Africa, 1915. Administration of German wireless station at Sayville taken over by American Government, 1915.
10	T	
11	W	Sir Wm. Robert Grove born, 1811; died, August 1st, 1896.
12	Th	
13	F	Berlin Treaty, 1878.
14	S	Bastille stormed, 1789. French Holiday.
15	S	**6th Sunday after Trinity** Events of Kingstown Regatta reported by wireless, 1898.
16	M	
17	T	Wireless communication between ship and shore established up to 10 miles 1897.
18	W	
19	Th	
20	F	Marconi's Wireless Telegraph Co., Ltd., formed, 1897.
21	S	
22	S	**7th Sunday after Trinity**
23	M	
24	T	Honorary G.C.V.O. conferred by the King on Senatore G. Marconi, 1914.
25	W	
26	Th	
27	F	Wireless Telegraphic Communication established between U.S.A. and Japan, 1915.
28	S	Austria-Hungary declared war on Serbia, 1914. Wireless telephony from Arlington to Hawaii accomplished, 1915.
29	S	**8th Sunday after Trinity** Dispersal of the Spanish Armada, 1588.
30	M	
31	T	TRINITY LAW SITTINGS END.

AUGUST, 1917

1	W	LAMMAS DAY. Germany declared War on Russia, 1914. Germany sent ultimatum to Belgium, 1914.
2	Th	
3	F	Germany declared war on France, 1914.
4	S	Great Britain declared war on Germany, 1914. First International Wireless Conference met at Berlin, [1903.
5	S	**9th Sunday after Trinity** First British-American Cable worked, 1858.
6	M	BANK HOLIDAY.
7	T	
8	W	
9	Th	Heligoland formally ceded to Germany, 1890.
10	F	Royal Observatory, Greenwich, founded, 1675. France declared war on Austria-Hungary, 1914.
11	S	
12	S	**10th Sunday after Trinity** Great Britain declared war on Austria-Hungary, 1914. Yap wireless station destroyed, 1914.
13	M	
14	T	Relief of Peking, 1900.
15	W	Wireless Telegraph Act of Great Britain passed, 1904.
16	Th	Robert William Bunsen died, 1899; born March 31st, 1811.
17	F	
18	S	
19	S	**11th Sunday after Trinity**
20	M	Italy declared war on Turkey, 1915.
21	T	
22	W	Wireless News Message Service to liners inaugurated, 1903.
23	Th	Japan declared war on Germany, 1914.
24	F	Kamura (Togoland) wireless station destroyed by Germans, 1914.
25	S	
26	S	**12th Sunday after Trinity**
27	M	Roumania declared war on Austria-Hungary, 1916. Italy declared war on Germany, 1916.
28	T	Germany declared war on Roumania, 1916.
29	W	Samoa Wireless Station captured, 1914.
30	Th	Turkey declared war on Roumania, 1916.
31	F	Kandahar, 1880.

SEPTEMBER, 1917

1	S	
2	**S**	**13th Sunday after Trinity** Board of Trade (Great Britain) constituted, 1786.
3	M	
4	T	Proclamation of French Republic, 1870. S.s. "Hesperian" torpedoed, 1915.
5	W	Malta taken, 1805.
6	Th	"Mayflower" sailed, 1620. President McKinley shot, 1901.
7	F	
8	S	Sir John Henniker Heaton, Bart., died, 1914; born, 1848.
9	**S**	**14th Sunday after Trinity** Luigi Galvani born, 1737; died, December 4th, 1798
10	M	
11	T	
12	W	Herbertshohe (Neu Pommern) wireless station captured, 1914.
13	Th	Quebec taken, 1759.
14	F	
15	S	Liverpool and Manchester Railway opened, 1830.
16	**S**	**15th Sunday after Trinity**
17	M	
18	T	Dr. Samuel Johnson born, 1709.
19	W	
20	Th	Poldhu Station masts wrecked, 1901.
21	F	
22	S	Michael Faraday born, 1791; died, August 25th, 1867.
23	**S**	**16th Sunday after Trinity** Autumnal Equinox.
24	M	
25	T	
26	W	Contract made between Lloyds' and Marconi Co. for wireless equipment of ten of Lloyds' stations, 1901.
27	Th	Duala (Cameroon) wireless station captured, 1914.
28	F	Strassburg capitulated, 1870.
29	S	MICHAELMAS DAY. Marconi British Coast Stations taken over by Post Office, 1909.
30	**S**	**17th Sunday after Trinity** Earl Roberts born, 1832; died, November 14th, 1914.

OCTOBER, 1917

1	M	
2	T	Major André hanged by Washington, 1780.
3	W	International Radiotelegraphic Conference met at Berlin, 1906.
4	Th	
5	F	Republic of Portugal proclaimed, 1910.
6	S	
7	**S**	**18th Sunday after Trinity**
8	M	Russian Marconi Company formed, 1908.
9	T	
10	W	Panama Canal completed, 1913.
11	Th	"Volturno" burnt in Mid-Atlantic, 1913 Saved, 521.
12	F	America discovered, 1492. Robert Stephenson died, 1859. MICHAELMAS LAW SITTINGS BEGIN.
13	S	First Aeroplane flight in U.S.A., 1893.
14	**S**	**19th Sunday after Trinity** Great Britain declared war on Bulgaria, 1915.
15	M	The Gregorian Calendar introduced, 1582.
16	T	
17	W	Wireless Transatlantic Public Service inaugurated, 1907.
18	Th	
19	F	Italy declared war on Bulgaria, 1915.
20	S	Battle of Navarino, 1827.
21	**S**	**20th Sunday after Trinity** TRAFALGAR DAY. Death of Lord Nelson, 1805.
22	M	
23	T	Edouard Branly born, 1844.
24	W	
25	Th	
26	F	
27	S	Metz capitulated, 1870.
28	**S**	**21st Sunday after Trinity** Present Royal Exchange opened, 1844.
29	M	George Morland, painter, died, 1804.
30	T	Admiral Lord Dundonald died, 1860.
31	W	ALL HALLOW EVE. Sir Joseph Wilson Swan born, 1828.

NOVEMBER, 1917

1	Th	Marconi Wireless Telegraph Company of Canada formed, 1902.
2	F	
3	S	International Radiotelegraphic Convention, Berlin, signed, 1906.
4	S	**22nd Sunday after Trinity**
5	M	Great Britain declared war on Turkey, 1914.
6	T	Sir William Preece died, 1913; born, February 15th, 1834.
7	W	Italian liner "Ancona" shelled and sunk, 1915.
8	Th	John Milton died, 1674; born, 1608.
9	F	Kiauchau wireless station captured, 1914.
10	S	Martin Luther born, 1483; died, February 18th, 1546.
11	S	**23rd Sunday after Trinity** MARTINMAS.
12	M	International Conference for Safety of Life at Sea opened, 1913.
13	T	Professor Clerk Maxwell born, 1831; died, November 5th, 1879.
14	W	Death of Earl Roberts, 1914. Born, September 30th, 1832.
15	Th	*Transatlantic Times* published at sea, 1899.
16	F	Inauguration of the Suez Canal, 1869.
17	S	Hospital ship "Anglia" mined, 1915.
18	S	**24th Sunday after Trinity**
19	M	Ferdinand de Lesseps born, 1805; died, December 7th, 1894.
20	T	
21	W	Hospital ship "Britannic" torpedoed, 1916.
22	Th	American Marconi Company formed, 1899.
23	F	
24	S	Trials with wireless on trains in America, 1913.
25	S	**25th Sunday after Trinity** Sir Isaac Newton born, 1642; died March 20th, 1727.
26	M	
27	T	
28	W	Private ownership of wireless apparatus prohibited by British Parliament, 1914.
29	Th	
30	F	William Gilbert died, November 30th, 1603; born, 1540.

DECEMBER, 1917

1	S	Macquarie Island wireless station closed for period of war, 1915.
2	S	**Advent Sunday**
3	M	
4	T	Luigi Galvani died, 1798; born, September 9th, 1737.
5	W	
6	Th	
7	F	
8	S	Falkland Islands Battle, 1914.
9	S	**2nd Sunday in Advent** John Milton born, 1608; died, November 8th, 1674.
10	M	Royal Academy instituted, 1768.
11	T	Sir William Preece lectured on "Telegraphy Without Wires," Mr. Marconi conducting experiments, 1896.
12	W	First wireless signals transmitted across the Atlantic, 1901.
13	Th	"Delhi" disaster, 1911.
14	F	George Washington died, 1799; born, February 22nd, 1732.
15	S	
16	S	**3rd Sunday in Advent** Amundsen reached the South Pole, 1911.
17	M	First Transatlantic wireless message sent, 1902.
18	T	
19	W	
20	Th	
21	F	MICHAELMAS LAW SITTINGS END.
22	S	Winter Solstice.
23	S	**4th Sunday in Advent**
24	M	Wireless communication with East Goodwin light ship, 1898.
25	T	**Christmas Day**
26	W	BANK HOLIDAY.
27	Th	
28	F	
29	S	S.s. "Persia" torpedoed, 1915.
30	S	**1st Sunday after Christmas** Rudyard Kipling born, 1865.
31	M	Charter granted to East India Company, 1600.

JEWISH CALENDAR

(A.M. 5677 and part of A.M. 5678).

A.M. 5677.		A.D. 1916.		
Tishri	1	September	28	Rosh Hashanah (New Year).
,,	4	October	1	Fast of Guedaliah.
,,	10	,,	7	Yom Kippur (Day of Atonement)
,,	15	,,	12	Feast of Tabernacles.
,,	21	,,	18	Hosana Raba.
,,	22	,,	19	Feast of the 8th day.
,,	23	,,	20	Rejoicing of the Law.
Hesvan	1	,,	28	New Moon.
Kislev	1	November	26	New Moon.
,,	25	December	20	Dedication of the Temple.
Tebet	1	,,	26	New Moon.
		A.D. 1917.		
,,	10	January	5	Fast. Siege of Jerusalem.
Sebat	1	,,	24	New Moon.
Adar	1	February	23	New Moon.
,,	13	March	7	Fast of Esther.
,,	14	,,	8	Purim.
,,	15	,,	9	Shusan.
Nisan	1	,,	24	New Moon.
,,	15	April	7	Festival of Passover.
,,	16	,,	8	,, ,, 2nd day.
,,	22	,,	14	,, ,, ends.
Izar	1	,,	23	New Moon.
Sivan	1	May	22	New Moon.
,,	6	,,	27	Pentecost. Festival of Weeks.
,,	7	,,	28	Pentecost, 2nd day.
Tamuz	1	June	21	New Moon.
,,	18	July	8	Fast of Tamuz.
Ab	1	,,	20	New Moon.
,,	9	,,	28	Fast of Ab.
Elul	1	August	19	New Moon.
A.M. 5678.				
Tishri	1	September	17	Rosh Hashanah (New Year).
,,	3	,,	19	Fast of Guedaliah.
,,	10	,,	26	Yom Kippur (Day of Atonement).
,,	15	October	1	Feast of Tabernacles.
,,	16	,,	2	,, ,, 2nd day.
,,	21	,,	7	Hosana Raba.
,,	22	,,	8	Feast of the 8th day.
,,	23	,,	9	Rejoicing of the Law.
Hesvan	1	,,	17	New Moon.
Kislev	1	November	16	New Moon.
,,	25	December	10	Hanuca, Dedication of the Temple
Tebet	1	,,	16	New Moon.

NOTE.—All Jewish Sabbaths and Festivals begin the previous Evening at Sunset.

MOHAMMEDAN CALENDAR

(1335th Year of Hejira, A.D. 1916-17).

Year of Hejira 1335.	A.D. 1916.	
Muharram	October	28
Saphar	November	27
Rabia I.	December	26
	A.D. 1917.	
Rabia II.	January	25
Jomada I.	February	23
Jomada II.	March	25
Rajab	April	23
Shaaban	May	23

Year of Hejira 1335.	A.D. 1917.	
Ramadán	June	21
Shawall	July	21
Dulkaada	August	19
Dulheggia	September	18
1336.		
Muharram	October	17
Saphar	November	16
Rabia I.	December	15

OLD STYLE CALENDAR, 1917.

(Used in Russia and the other Orthodox States).

A.D. 1917. A.M. 7425.

Old Style.		Certain Holy Days.	New Style.	
January	1	Circumcision	January	14
,,	6	Theophany (Epiphany)	,,	19
February	2	Hypapante	February	15
,,	5	Carnival Sunday	,,	18
,,	19	First Sunday in Lent	March	1
March	9	Forty Martyrs	,,	22
,,	25	Annunciation of Theotokos	April	7
,,	26	Palm Sunday	,,	8
,,	31	Great Friday	,,	13
April	2	Holy Pasch (Easter Day)	,,	15
,,	23	St. George	May	6
May	9	St. Nicolas*	,,	22
,,	11	Ascension	,,	24
,,	14	Coronation of the Emperor*	,,	27
,,	21	St. Constantine the Great	June	3
,,	21	Pentecost	,,	3
,,	22	Holy Ghost	,,	4
June	29	Peter and Paul, Chief Apostles	July	12
August	1	First day of Fast of Theotokos	August	14
,,	6	Transfiguration	,,	19
,,	15	Repose of Theotokos (Assumption)	,,	28
,,	30	St. Alexander (Nevsky)*	September	12
September	8	Nativity of Theotokos	,,	21
,,	14	Exaltation of the Cross	,,	27
October	1	Patronage of Theotokos*	October	14
,,	21	Accession of the Emperor*	November	3
November	15	First day Fast of the Nativity	,,	28
,,	21	Entrance of Theotokos	December	4
December	6	St. Nicolas	,,	19
,,	9	Conception of Theotokos	,,	22
,,	25	Nativity	January	7

* Peculiar to Russia.

1918 CALENDAR 1918

JANUARY.

S		6	13	20	27
M		7	14	21	28
Tu	1	8	15	22	29
W	2	9	16	23	30
Th	3	10	17	24	31
F	4	11	18	25	
S	5	12	19	26	

FEBRUARY.

S		3	10	17	24
M		4	11	18	25
Tu		5	12	19	26
W		6	13	20	27
Th		7	14	21	28
F	1	8	15	22	
S	2	9	16	23	

MARCH.

S		3	10	17	24	31
M		4	11	18	25	
Tu		5	12	19	26	
W		6	13	20	27	
Th		7	14	21	28	
F	1	8	15	22	29	
S	2	9	16	23	30	

APRIL.

S		7	14	21	28
M	1	8	15	22	29
Tu	2	9	16	23	30
W	3	10	17	24	
Th	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

MAY.

S		5	12	19	26
M		6	13	20	27
Tu		7	14	21	28
W	1	8	15	22	29
Th	2	9	16	23	30
F	3	10	17	24	31
S	4	11	18	25	

JUNE.

S		2	9	16	23	30
M		3	10	17	24	
Tu		4	11	18	25	
W		5	12	19	26	
Th		6	13	20	27	
F		7	14	21	28	
S	1	8	15	22	29	

JULY.

S		7	14	21	28
M	1	8	15	22	29
Tu	2	9	16	23	30
W	3	10	17	24	31
Th	4	11	18	25	
F	5	12	19	26	
S	6	13	20	27	

AUGUST.

S		4	11	18	25
M		5	12	19	26
Tu		6	13	20	27
W		7	14	21	28
Th	1	8	15	22	29
F	2	9	16	23	30
S	3	10	17	24	31

SEPTEMBER.

S	1	8	15	22	29
M	2	9	16	23	30
Tu	3	10	17	24	
W	4	11	18	25	
Th	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

OCTOBER.

S		6	13	20	27
M		7	14	21	28
Tu	1	8	15	22	29
W	2	9	16	23	30
Th	3	10	17	24	31
F	4	11	18	25	
S	5	12	19	26	

NOVEMBER.

S		3	10	17	24
M		4	11	18	25
Tu		5	12	19	26
W		6	13	20	27
Th		7	14	21	28
F	1	8	15	22	29
S	2	9	16	23	30

DECEMBER.

S	1	8	15	22	29
M	2	9	16	23	30
Tu	3	10	17	24	31
W	4	11	18	25	
Th	5	12	19	26	
F	6	13	20	27	
S	7	14	21	28	

RECORD OF THE DEVELOPMENT OF WIRELESS TELEGRAPHY AND TELEPHONY, AND INTERESTING ITEMS IN RELATION THERETO.

1831.

MICHAEL FARADAY discovered electro-magnetic induction between two entirely separate circuits.

1837.

The first patent for an electric telegraph taken out by Cooke and Wheatstone (London) and by Morse (U.S.A.).

1838.

K. A. Steinheil (Munich) discovered the use of the earth return, and suggested that the remaining metallic portion of the circuit might be dispensed with entirely, and a system of wireless telegraphy established.

1840.

Joseph Henry (U.S.A.) first produced high-frequency electric oscillations, and pointed out that the discharge of a condenser is oscillatory.

1842.

S. F. B. Morse made wireless experiments by electric conduction through water across Washington Canal and across wide rivers.

Joseph Henry noticed that a single electric spark about one inch long thrown into a circuit of wire in an upper room could magnetise steel needles included in a parallel circuit of wire placed in a cellar underground thirty feet below with two floors intervening. He was one of many observers prior to Hertz who had noticed curious effects due to electric sparks produced at a distance, which were commonly ascribed to ordinary electro-magnetic induction.

1843.

James Bowman Lindsay, of Dundee, suggested that if it were possible to provide stations not more than twenty miles apart all the way across the Atlantic, there would be no need to lay any cable.

1845.

Lindsay began making experiments across the River Tay, his method being to transmit messages by means of electricity or magnetism through and across the water without submerged wires, the water being utilised as the conducting medium.

1849.

Dr. O'Shaughnessy (afterwards Sir William O'Shaughnessy Brooke) succeeded in passing intelligible signals without any metallic conduction across the River Hooghly, 4,200 ft. wide, in India, but he found the cost of power prohibitive.

1859.

Bowman Lindsay gave a demonstration of his conduction system to the British Association Meeting, at which Michael Faraday and Sir William Thompson (afterwards Lord Kelvin) were both present. William H. Preece (afterwards Sir William) was deputed by the Electric Telegraph Company to report on Lindsay's system.

1862.

John Heyworth patented a method of conveying electric signals without the intervention of any continuous artificial conductor. Cromwell Varley tried this method, but found it a failure.

1867.

James Clerk Maxwell read a paper before the Royal Society, in which he laid down the theory of electro-magnetism, which he developed more fully in 1873, in his great treatise on electricity and magnetism. He predicted the existence of the electric waves that are now used in wireless telegraphy.

1870.

Von Bezold discovered that oscillations set up by a condenser discharge in a conductor give rise to interference phenomena.

1872.

Henry Highton made various experiments across the River Thames with Morse's method.

1879.

David E. Hughes discovered the phenomena on which depends the action of what was subsequently known as the coherer, which many years later were used in early electric-wave signalling. He found that a tube of metallic filings was sensitive to electric sparks made in its vicinity, and he was able to obtain such effects on a tube connected to a battery and a telephone at a distance of five hundred yards.

1880.

John Trowbridge, of Harvard, systematically studied the problem of propagation of electric current through "earth," either soil or water, and he found that signalling might be carried on over considerable distances by electric conduction through the earth or water between places not metallically connected.

1882.

Graham Bell experimented with Trowbridge's method on the Potomac River, when signals were detected at a distance of $1\frac{1}{2}$ miles.

Sir William H. Preece made an experiment, using Morse's method, to connect the Isle of Wight with the mainland across the Solent on two occasions during the failure of the submarine cable in the Solent.

1883.

Willoughby Smith, in a paper before the Institution of Civil Engineers, London, suggested that electric induction might be employed for railway signalling.

Heinrich Rudolph Hertz became *privat docent* at Kiel, where he began studies in Maxwell's electro-magnetic theory.

G. F. Fitzgerald suggested a method of producing electro-magnetic waves in space by the discharge of a condenser.

1885.

Thomas A. Edison, with the assistance of Messrs. Gilliland, Phelps, and W. Smith, worked out a system of communication between railway stations and moving trains by means of induction and without the use of conducting wires.

Sir W. H. Preece made experiments at Newcastle-on-Tyne which showed that in two completely insulated circuits of square form, each side being 440 yards, placed a quarter of a mile apart, telephonic speech was conveyed from one to the other by induction.

1886.

A. E. Dolbear, of Tuft's College, Boston, patented a plan for establishing wireless communication by means of two insulated elevated plates, but there is no evidence that the method proposed by him did, or could, effect the transmission of signals between stations separated by any distance.

1887.

Heinrich Rudolph Hertz discovered the progressive propagation of electro-magnetic action through space, and was able to measure the length and velocity of electro-magnetic waves, and to show that in the transverse nature of their vibration, and their susceptibility to refraction and polarisation, they are in complete accordance with the waves of light and heat.

Hertz employed as a detector of the electric wave a simple nearly-closed circuit of wire, called the "Hertz Resonator," but it was subsequently discovered that the metallic microphone of Hughes was a far more sensitive detector.

A. W. Heaviside established communication by telephonic speech between the surface of the earth and the subterranean galleries of the Broomhill Collieries, 350 ft. deep, by laying above and below ground two complete metallic circuits, each about 2¼ miles in length, and parallel to each other.

1889.

Elihu Thompson suggested that electric waves were particularly suitable for the transmission of signals through fogs and material objects.

1891.

John Trowbridge suggested that by means of magnetic induction between two separate and completely insulated circuits communication could be effected between distances.

1892.

Edouard Branly devised an appliance for detecting electro-magnetic waves, which was known as a "coherer." He discovered that these waves had the power of affecting the electric conductivity of materials when in the state of a powder.

Sir W. H. Preece adopted a method which united both conduction and induction as the means of affecting one circuit by the current in another. In this way he established communication between two points on the Bristol Channel, and at Lochness, in Scotland.

C. A. Stevenson, of the Northern Lighthouse Board, Edinburgh, advocated the use of an inductive system for communication between the mainland and isolated lighthouses.

1894.

E. Rathenau, of Berlin, experimented with a conductive system of wireless telegraphy, and signalled through three miles of water.

1895.

Mr. G. Marconi's investigations led him to the conclusion that Hertzian waves could be used for telegraphing without wires, and he made important experiments at his father's home in Italy.

Willoughby Smith established communication by conduction with the lighthouse on the Fastnet.

1896.

In February Mr. Marconi came to England, and on June 2nd lodged his application for the first British Patent for Wireless Telegraphy, No. 12,039 of 1896.

In July of that year he was introduced to Sir William H. Preece, the Chief Electrical Engineer of the Post Office, at whose request Mr. Marconi conducted experiments over a distance of about 100 yards before the officials of the Post Office. Shortly afterwards a further series of trials was conducted by Mr. Marconi on Salisbury Plain, when communication was successfully established over a distance of $1\frac{3}{4}$ miles.

On December 11th, 1896, Sir William H. Preece lectured on "Telegraphy without Wires," Mr. Marconi conducting the experiments.

1897.

In March, 1897, Mr. Marconi demonstrated before the representatives of various Government Departments, communication being established over a distance of 4 miles.

In May further trials were made between Lavernock and Flatholm, a distance of over three miles; and on the 13th of that month the late Professor Slaby was present at further trials, when communication was established over a distance of about 8 miles.

In July Mr. Marconi gave a demonstration of his invention at the Admiralty in Rome, and before King Humbert at the Royal Palace of the Quirinal. Between July 10th and 18th trials were made at Spezia, and on the 17th and 18th communication was maintained between the shore and the Italian cruiser *San Martin* at sea, at distances up to 10 miles.

On July 20th, 1897, the Wireless Telegraph and Signal Company, Limited, was incorporated, with a capital of £100,000, to acquire Mr. Marconi's patents in all countries except Italy and dependencies.

On August 27th, 1897, the late Professor Slaby lectured on Wireless Telegraphy at the Sailors' Home, Potsdam, before the German Emperor and Empress and the King of Spain.

In September and October Mr. Marconi further experimented on Salisbury Plain. Trials were also made by officials of the Post Office at Dover. Apparatus was erected at Bath, and signals received from Salisbury, 34 miles away.

The first Marconi station was erected at the Needles, Isle of Wight,

in November, and experiments conducted between that station and Bournemouth, a distance of 14½ miles.

In December, in the presence of Captain Kennedy, R.E., tests were made between the Needles station and a steamer, readable signals being received up to a distance of 18 miles.

1898.

In May, 1898, Mr. Marconi experimented between St. Thomas's Hospital and the House of Commons. In the same month experiments were carried out between Ballycastle and Rathlin Island, a distance of 7½ miles.

On June 3rd Lord Kelvin visited the Needles station and sent from there the first paid marconigram.

On July 20th and 22nd the events of the Kingstown Regatta were reported by wireless telegraphy, for the Dublin *Daily Express*, from the steamer *Flying Huntress*, equipped with Marconi apparatus.

On August 3rd wireless telegraphic communication was established between the Royal yacht *Osborne* and Ladywood Cottage, Osborne, in order that Queen Victoria might communicate with the then Prince of Wales. Constant and uninterrupted communcation was maintained during the sixteen days the system was in use.

In September the installation at Bournemouth was removed to Poole Harbour, Dorset.

By arrangement with Trinity House, wireless apparatus was installed in December, 1898, on the East Goodwin Lightship and at the South Foreland Lighthouse, the intervening distance being 12 miles.

1899.

During a gale in January, 1899, the East Goodwin Lightship was damaged, and the mishap reported by wireless telegraphy to Trinity House.

On March 2nd Mr. Marconi read a paper on Wireless Telegraphy at the Institution of Electrical Engineers.

On March 3rd the s.s. *R. F. Matthews* ran into the East Goodwin Lightship. The accident was reported by wireless telegraphy to the South Foreland Lighthouse, and assistance was promptly sent.

On March 27th communication was established between Wimereux, near Boulogne, and the South Foreland Lighthouse.

During the naval manœuvres in July three British warships, equipped with Marconi apparatus, correctly interchanged messages at distances up to 74 nautical miles (about 85 land miles).

In September Marconi Stations were installed at Chelmsford and Dovercourt.

During the meetings of the British Association at Dover and of the Association Française pour l'Avancement de Science at Boulogne, in August, communication was maintained by means of apparatus installed at the Dover Town Hall and at Wimereux.

The international yacht races which took place in September and October were reported by wireless telegraphy for the *New York Herald*. At the conclusion of the races, series of trials were made between the United States cruiser *New York* and the battleship *Massachusetts*, signals being exchanged between the vessels at distances up to about 36 miles. On the return journey from America Mr. Marconi fitted the s.s. *St. Paul* with his apparatus, and on November 15th established communication with the Needles Station when 36 miles away. Reports of the progress of the war in South Africa were telegraphed to the vessel, and published in a leaflet entitled "The Transatlantic Times," printed on board.

In October the War Office adopted Marconi apparatus for use in the field in South Africa, and on November 2nd six electricians left for South Africa with sets of apparatus. These proved of considerable service to the army and the navy, to which latter they were subsequently transferred.

On November 22nd, the Marconi Wireless Telegraph Company of America was formed for the purpose of exploiting Marconi patents in the United States of America and possessions.

1900.

On February 2nd Mr. Marconi delivered a discourse on Wireless Telegraphy at the Royal Institution.

In March the Marconi system was adopted by the Norddeutscher Lloyd Steamship Co., and apparatus installed on the Borkum Riff Lightship, Borkum Lighthouse, and *Kaiser Wilhelm der Grosse*.

On April 25th the Marconi International Marine Communication Company was incorporated, with offices in London and Brussels, and agencies in Paris and Rome, for the maritime working of the Marconi system.

On July 4th a contract was made with the British Admiralty for the installation of apparatus on twenty-six of His Majesty's ships and six Admiralty coast stations.

In October the erection of the High Power Station at Poldhu was commenced. The aerials were supported by 20 masts, each 210 ft. high.

In November the first wireless telegraph station in Belgium was installed at La Panne.

1901.

On January 1st the barque *Medora* was reported by wireless as waterlogged on Ratel Bank. Assistance was immediately sent.

On January 8th wireless telegraph experiments on the *Princesse Clémentine* were carried out during a storm, communication being main-

tained the whole way from Ostend to Dover. On January 19th *Princesse Clémentine* ran ashore, and news of the accident was telegraphed to Ostend by wireless.

In February communication was established between Niton Station, Isle of Wight, and the Lizard Station, a distance of 196 miles.

On March 1st a public Wireless Telegraph Service was inaugurated between the five principal islands of the Hawaiian group, viz., Oahu, Kauai, Molaki, Maui, and Hawaii.

In April communication was successfully established and maintained between a station at Calvi, Corsica, and another at Antibes, in the Riviera.

On May 15th, 1901, Mr. Marconi read a paper on Syntonic Wireless Telegraphy at the Royal Society of Arts, London.

The first British ship, the s.s. *Lake Champlain,* was equipped with wireless telegraphic apparatus on May 21st. About the same date coast stations in England and Ireland were opened for communication with ships at sea as follows:—Crookhaven, Co. Cork; Rosslare, Co. Wexford; Holyhead; Caister, near Yarmouth; North Foreland.

The masts at Poldhu were wrecked during a very heavy gale on September 20th, and the masts at Cape Cod shared a like fate in the November following. The masts were then replaced by four towers, 210 ft. high, built of timber.

On September 26th a 14 years' contract was made for the installation of wireless apparatus at ten of Lloyds' Signal Stations.

The Compagnie de Télégraphie sans Fil of Brussels was formed on October 26th, to develop and work the Marconi system on the Continent.

On December 12th and 13th signals were received by Mr. Marconi at St. John's, Newfoundland, from Poldhu station, Cornwall, a distance of 1,800 miles.

1902.

In February Mr. Marconi received on board the s.s. *Philadelphia* readable messages up to a distance of $1,551\frac{1}{2}$ statute miles, and signals up to a distance of 2,099 statute miles from Poldhu Station, Cornwall.

Mr. Marconi lectured on the "Progress of Electric Space Telegraphy" at the Royal Institution of Great Britain on June 13th.

On July 14th-16th Mr. Marconi received messages from Poldhu on the Italian battleship *Carlo Alberto,* lying at Cape Skagen, a distance of 800 miles; and at Kronstadt, 1,600 miles.

The Colonial Premiers who were in England for King Edward's coronation witnessed a demonstration of Mr. Marconi's invention on board the *Koh-i-noor.*

The Marconi Wireless Telegraph Company of Canada was formed on November 1st, and in December wireless messages were despatched by the Cape Breton Station from Mr. Marconi and from the Earl Minto to His Majesty King Edward VII. Mr. Marconi also sent a message

to King Victor of Italy. Mr. Marconi was made a member of the Italian Order of Merit.

1903.

President Roosevelt sent a Transatlantic message to King Edward VII. *viâ* Cape Cod and Poldhu Stations on January 19th. High-power and other stations were ordered by the Italian Government, and the Italian Senate and Chamber of Deputies tendered a vote of thanks to Mr. Marconi for the results obtained with wireless telegraphy.

The first Transatlantic marconigram was published in *The Times* on March 30th.

On April 5th the first licence for the erection of an Italian high-power station was granted.

The Compagnie Française Maritime et Coloniale de Télégraphie Sans Fil was formed on April 24th to exploit the Marconi system in France.

An agreement was made on July 24th by the British Admiralty for the general use of the Marconi system in the Navy.

The first International Conference on Wireless Telegraphy was held in Berlin on August 4th.

On August 22nd a wireless telegraphic service of news to ships at sea was inaugurated.

The passengers of the Red Star liner *Kroonland*, which was disabled on December 8th, 130 miles west of the Fastnet, were saved great inconvenience by wireless communication being established with the Crookhaven Station.

Mr. Marconi was made a Knight of the Order of St. Anne of Russia.

1904.

Meteorological information was supplied by wireless to the *Daily Telegraph*.

Accidents to s.s. *New York* and the s.s. *Friesland* early in the year were reported by wireless telegraphy.

1905.

Judgment given by Judge Townsend in New York on May 4th in favour of the Marconi Company in its action against the De Forest Wireless Telegraph Company for infringement of patents.

On May 12th the Canadian Government ordered stations for Cape Sable (N.S.) and St. John (N.B.), and on May 30th instructions were given for five more lightships to be installed with wireless apparatus for Trinity House.

Erection of the Clifden High-Power Station (Ireland) was commenced in October.

Mr. Marconi was made a Civil Member of the Royal Order of Savoy.

In 1905 Mr. Marconi took out his patent for the horizontal directional aerial (No. 14,788), which marked a step of great importance in the progress of long-distance work.

1906.

In May a contract was entered into between the British Post Office and the Marconi Company whereby the latter was charged with the erection of wireless stations at Tobermory and Loch Boisdale, Scotland.

On August 4th the Argentine Marconi Company was formed to work Marconi patents in Argentina and Uruguay.

In October and November an International Radiotelegraphic Conference was held at Berlin, and a convention signed by most of the countries of the world.

1907.

Marconi Transatlantic Stations at Clifden, Ireland, and Glace Bay, (Nova Scotia) were opened for limited public service on October 17th.

1908.

On February 3rd transatlantic stations were opened to the general public for transmission of messages between the United Kingdom and the principal towns in Canada.

Mr. Marconi lectured on "The Commercial Application of Wireless Telegraphy" at Liverpool, on February 24th.

The Russian Company of Wireless Telegraphs and Telephones was formed on October 8th.

1909.

The *Republic*, after collision with the s.s. *Florida* off the coast of the United States on January 23rd, succeeded in calling assistance by wireless, with the result that all her passengers and crew were saved before the vessel sank.

Mr. Marconi lectured before the Dutch Royal Institute of Engineers in May and in December.

The Marconi British coast stations were taken over by the Postmaster-General on September 29th, who was granted a licence to use the company's patents.

In December Mr. Marconi lectured at the Royal Academy of Science, Stockholm, and (with Prof. Braun) was awarded the Nobel Prize for Physics.

1910.

Mr. Marconi, *en route* for Buenos Aires on board the *Principessa Mafalda*, received messages from Clifden at a distance of 4,000 miles by day and 6,735 miles by night.

The Compania Naciońal de Telegrafia sin Hilos was formed on December 24th to exploit the Marconi system in Spain.

1911.

On February 21st judgment was given in the action instituted in December, 1910, by the Marconi Company against the British Radio-telegraph and Telephone Company for infringement of their tuning patent No. 7777 of 1900. Mr. Justice Parker's decision was in favour of the Marconi Company, and he granted them a certificate of validity of their patent and an injunction, together with costs and damages.

A contract was made between the Marconi Company and the Canadian Government for operating wireless telegraph stations in Canada for a period of 20 years.

Stations at Teneriffe, Cadiz, Barcelona, and Las Palmas were opened for public business by the Compania Naciońal de Telegrafia sin Hilos, the *concessionnaires* of the public wireless telegraph service of Spain.

The Imperial Conference held in May approved the proposal that an Imperial Wireless Telegraph system should be created.

Mr. Marconi lectured on "Radiotelegraphy" at Royal Institution on June 2nd.

The Lodge-Muirhead patents were acquired by the Marconi Company, and Sir Oliver Lodge became a scientific adviser to the company.

1912.

Early in the year the American Marconi Company absorbed the United Wireless Company of the United States.

On January 27th the central station of the Spanish wireless service (Aranjuez) was opened by King Alfonso XIII.

In February the Marconi Company secured the patents of Bellini and Tosi, including those for the wireless direction-finder.

On April 15th the s.s. *Titanic* struck an iceberg and sank, but, owing to the prompt wireless call for assistance, the lives of more than 700 of her passengers were saved.

Mr. Marconi, whilst in America, delivered an address on the "Progress of Wireless Telegraphy" before the New York Electrical Society, on April 17th.

The International Radiotelegraphic Conference, opened in London on June 4th, approved important regulations to secure uniformity of practice in wireless telegraphic services.

The British Government entered into a contract in July with the Marconi Company for the erection of a chain of high-power Wireless Telegraph stations, as recommended at the Imperial Conference held in 1911.

The Marconi Wireless Telegraph Company of Canada was entrusted by the Dominion Government on September 17th with the working of the existing stations on the Great Lakes until 1931, and also with the erection of further stations. A similar arrangement was made in December with the Newfoundland Government for stations at Belle Isle, and on the Labrador coast.

Mr. Marconi was decorated with the Grand Cross of the Order of Alfonso XII., and made a Grand Officer of the Order of St. Maurice and Lazarus.

1913.

During this year the Governments of France and the United States experimented between the Eiffel Tower station and Washington by wireless, in securing exact data for comparing the velocity of grounded electro-magnetic waves to that of light.

In January, the High Court of Justice of France delivered a judgment declaring the validity of all claims of the Marconi patent 305060, which corresponds with the "four sevens" patent.

On January 23rd the Postmaster-General appointed a committee "To consider and report on the merits of the existing systems of long-distance wireless telegraphy, and in particular as to their capacity for continuous communication for the distances required by the Imperial Chain." The Committee reported that "The Marconi system is at present the only system of which it can be said with any certainty that it is capable of fulfilling the requirements of the Imperial Chain."

As a result of the official enquiry into the loss of the *Titanic*, the *Scotia*, equipped with a Marconi wireless installation, left Dundee on March 8th to patrol the waters of the North Atlantic and to collect information regarding the movement of ice.

In June a Wireless Telegraph Bill was presented to the Ottawa Parliament, and passed under the title: "Radiotelegraph Act of Canada."

On October 11th the *Volturno* was burnt in mid-Atlantic, and in response to the wireless appeal ten vessels came to the rescue, 521 lives being saved.

The Wireless Society of London was formed in October.

On November 12th an International Conference for the purpose of considering means of saving life at sea was opened in London by the President of the Board of Trade.

On November 24th the first practical trials with wireless apparatus on trains were made on a train belonging to the Delaware, Lackawanna and Western Railroad of America.

On November 25th Commander H. A. Edwards, who was at the head of the Bolivian Survey Commission, reported that the Commission had been able to determine the difference of longitude between the Brazilian towns Mañaos and Porto Velho by means of wireless signals.

Dr. Mawson, whilst exploring in Antartica, was enabled by means of wireless to keep in touch with the outer world through the station on Macquarie Island.

During his expedition to Central Asia in 1913, Dr. Filippo de Filippi, the Italian explorer, frequently determined his longitude by means of wireless time signals transmitted from Lahore.

1914.

On January 20th the Safety of Life at Sea Convention, drawn up by the International Conference which met on November 14th, 1913, was signed at London. That section of the Convention which deals with Wireless Telegraphy lays down the minimum wireless telegraphy equipment to be carried by vessels of different grades.

Early in the year an International Wireless Conference met at Brussels. The object of the Conference was to adopt a programme whereby careful observations could be taken with a view to arriving at some practical explanation of the laws governing the variation in the strength of wireless signals.

During the early part of March Mr. Marconi joined one of the Italian war vessels attached to the squadron commanded by the Duke of Abruzzi. Experiments in wireless telephony were carried out between several vessels lying at anchor $\frac{5}{8}$ mile apart, ordinary receivers being used with great success. The wireless telephone experiments were continued between two warships on the high seas, and the reception was consistently perfect over a distance of $18\frac{1}{2}$ miles. Later successful wireless telephone communications were effected, using only very limited energy between vessels on the high seas 70 km. (44 miles) apart. These experiments were repeated where land intervened between the communicating vessels, and in this case again excellent results were obtained. On this day radiotelephonic communication was constantly maintained for twelve hours.

This year saw the first practical application of wireless to lifeboats belonging to large ocean steamships, the Marconi Company having designed a special type of apparatus for this purpose.

On April 12th the Council of the Royal Society of Arts presented the Society's Albert Medal to Mr. Marconi for his services in the development and practical application of wireless telegraphy.

On April 15th, at Godalming, a memorial was unveiled to the memory of Jack Phillips, chief wireless telegraphist of the ill-fated *Titanic,* who "died at his post when the vessel foundered in mid-Atlantic on the 15th day of April 1912."

On May 29th the s.s. *Empress of Ireland* foundered after a collision with the Norwegian collier *Storstad*, and over 500 people were saved

On June 8th a report was issued by the Committee appointed by the Postmaster-General to consider how far and by what methods the State should make provision for research work in Wireless Telegraphy. This report recommends (1) that the Government should establish a National Committee for Telegraphic Research which would promote in the public interest, both by theoretical investigation and by experiment, the progress of scientific telegraphy and telephony, and (2) that the Government should establish a National Research Laboratory, with a special scientific staff to undertake, under the direction of the Committee, and on the lines laid down in this report, telegraphic investigation, the results of which should be available for all departments of the public service.

In June, important tests were made with the Marconi-Bellini-Tosi wireless direction finder on board the s.s. *Royal George*. During a voyage from Bristol to Montreal the liner, even in the thickest weather and without the aid of compass or sextant, was enabled to find her position when within a radius of about fifty miles of a land wireless station.

On July 24th the King conferred upon Mr. Marconi the Honorary Knighthood of the Grand Cross of the Victorian Order.

On July 24 judgment for plaintiffs was delivered in an action brought by the Marconi Company against the Helsby Wireless Telegraph Company, Limited, for infringement of patent 7777 of 1900.

[Upon the outbreak of war in August the greater part of wireless research work had to be suspended, and our record cannot of course divulge many of the developments which have taken place since that time, as these have an important bearing upon the prosecution of the war and are secret.—Ed.]

On August 9th the wireless station at Dar-es-Salaam, German East Africa, was announced to have been destroyed by the British.

The German station at Yap, Caroline Islands, was destroyed on August 12th.

On August 24th the Germans blew up the giant station at Kamina, Togoland, to prevent its falling into the hands of the British.

On August 24th the United States Government notified the owners of the German Transatlantic station at Tuckerton, New Jersey, that its experimental licence had expired, and it must therefore close down. Arrangements were afterwards made for restricted working.

On August 29th the German wireless station at Samoa was captured by an Australian Naval Force.

The German station at Nauru, Marshall Islands, was captured shortly after this.

On September 12th an Australian Naval Reserve Force captured the German wireless station at Herbertshohe on the island of Neu Pommern.

The powerful German station at Duala, Cameroons, was seized on September 27th.

On November 9th a Japanese force occupied Kiauchau and its wireless station.

On November 13th the Marconi Wireless Telegraph Company of America obtained a preliminary injunction against the De Forest Radio Telephone and Telegraph Company and the Standard Oil Company in a suit for infringement of patent.

On November 28th the following notice, under the Defence of the Realm (Consolidation) Regulations 1914 was issued : "No person shall, without the written permission of the Postmaster-General, buy, sell, or have in his possession or under his control any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus."

During the year high-power trans-oceanic stations were completed at Carnarvon (Wales), Belmar, New Jersey (U.S.A.), Honolulu (Hawaiian Islands), and San Francisco (Cal.). The Honolulu and San Francisco stations were formally opened to public service on September 24th.

1915.

In January Senatore Marconi took his seat in the Italian Senate.

On February 20th the Panama-Pacific Exhibition at San Francisco was officially opened by President Wilson at Washington, through the medium of wireless telegraphy.

A wireless telegraph service between Spain and Italy was inaugurated on May 1st.

On May 12th the German high-power wireless station at Windhoek was captured by a South African force.

On May 12th, in Battery Park, New York, the Mayor of New York unveiled the monument in memory of wireless operators who had lost their lives at the post of duty.

On July 8th, as a result of investigations into alleged breaches of neutrality, the United States Government decided to take over the control of the Telefunken wireless station at Sayville, Long Island.

At the end of August the submarine cable between Oban and south-east Mull broke, and until its repair wireless telegraphy formed the only means of communication between the outlying islands and the mainland.

At the annual meeting of Marconi's Wireless Telegraph Company on July 26th Mr. Godfrey Isaacs announced the complete destruction of the German wireless chain, upon which our enemy had expended so much money, and on which they based their high hopes of a commercial world-domination.

On July 27th wireless communication between the United States and Japan was effected. The two terminal stations were situated at San Francisco and Funabashi, near Tokio, and the messages were relayed through Honolulu.

At the British Association meeting, held in September, three papers on wireless telegraphy were read, the first, by Dr. W. H. Eccles and Mr. A. J. Makower, was entitled "Electric Oscillations in Couple Circuits—A Class of Particular Cases." The second paper, by Professor G. W. O. Howe, dealt with "The Capacity of Aerials of the Umbrella Type." The final paper was entitled "A Note on Earth Resistance," and came from Professor E. W. Marchant.

On September 28th the American Telephone and Telegraph Company, working in conjunction with the Western Electric Company, succeeded in telephoning by wireless across the American Continent from Arlington to Hawaii, a distance of nearly 5,000 miles.

In September a commercial wireless service was inaugurated between Japan and foreign countries viâ Ochüshi and Petropavlovsk, in Siberia.

On October 26th the wireless telephone experiments were continued, communication being effected across the Atlantic from Arlington to the Eiffel Tower, Paris.

In November Mr. Daniels, United States Secretary of the Navy, successfully transmitted from Washington a wireless telephonic naval order to Rear-Admiral Usher at Brooklyn Naval Yard.

1916.

In January, by an Order in Council, His Britannic Majesty prohibited to all destinations the export of material for wireless telegraphs and telephones.

In February the Pope, restoring an ancient custom of the Church, announced his intention of officially blessing wireless telegraphy in recognition of its services to mankind.

During the course of a severe blizzard in the United States during February wireless telegraphy was extensively used for train despatching, as the telegraph wires had been destroyed.

In the early part of the year wireless enthusiasts in Holland formed a wireless association, "The Nederlandsche Vereeniging voor Radio-Telegraphie," with headquarters at The Hague.

During the Irish rebellion at Easter in this year wireless telegraphy played an important part, as the insurgents had entirely isolated Ireland by cutting the cable to England.

Among the subjects discussed at the Pan-American Conference held at Buenos Aires in April last was the control of wireless telegraphy. This forms a big step forward on the part of the South American Republics, clearly proving their appreciation of the necessity of a reliable wireless telegraphic service.

The determination of the difference in longitude between Paris and Washington with the aid of wireless telegraphy, which has been in progress since October, 1913, was completed in May, the result,

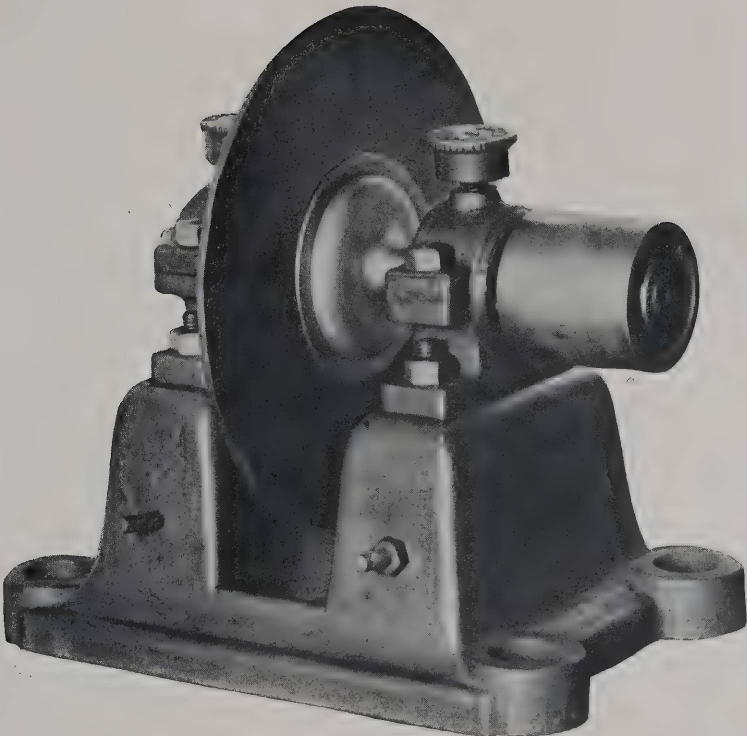
expressed in terms of time, being 5 hours 17 minutes 35·67 seconds, and has a probable accuracy of the order of ·01 second.

On July 28th the *London Gazette* printed the text of a new official regulation requiring the owner of every vessel of 3,000 tons or over registered at a British port in the United Kingdom to take out a licence for a wireless installation before August 21st, 1916, irrespective of whether his ship carries passengers or not.

On September 20th, Judge Mayer, of the U.S.A. District Court, delivered an important decision regarding the suit tried before him, affecting the patents involved in the Fleming-Vale controversy, between the American Company and the De Forest Radio Telegraph and Telephony Company. He gave his decision in favour of the former, and his judgment has been pronounced to constitute one of the finest and most technically correct opinions ever delivered from the American Bench.

On November 12th, Senatore Marconi delivered an important lecture at the Lincei Academy, Rome, before H.R.H. the Duke of Genoa, and a most distinguished audience. He took as his subject those problems of Radiotelegraphy, to which scientists are likely to direct their attention in the immediate future.

The initiation of the newly-established Trans-Pacific Wireless Service between the U.S. and Japan was celebrated on Wednesday, November 5th, by an interchange of messages between the Mikado and President Wilson. Whilst the world's greatest war has been raging with unabated fury in Europe this new enterprise, carried out by the Marconi Company, demonstrates the progress of wireless communication in zones wherein men are unobsessed by preoccupation in mutual destruction.



FIRST DISC DISCHARGER EVER MADE. (SMOOTH.)

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NATIONAL AND INTERNATIONAL WIRELESS LAWS AND REGULATIONS

THE signing of the International Convention for the Safety of Life at Sea on January 20th, 1914, constituted a most noteworthy advance in the legislation relating to Wireless Telegraphy. The Convention was drawn up by an International Conference which met at London on November 12th, 1913, and laid down, *inter alia,* the minimum Wireless Telegraphy equipment to be carried by ships of different grades. For the purpose of defining the hours of service (*i.e.,* setting out the times when the various stations are to open for the receipt and transmission of messages) the Radiotelegraphic Convention, 1912, divided ship stations into three classes, but did not specify which vessels (by virtue of the services maintained on board) should be placed in the various classes. Under the provisions of the Safety of Life at Sea Convention which deal with Wireless Telegraphy these classes are clearly defined.

In order to give effect to this International Convention, the British Government has amended the laws relating to merchant ships by the Merchant Shipping (Convention) Act, 1914. Part III. of the Act deals with Wireless Telegraphy, and is reprinted under "*Great Britain*" in the "*Laws and Regulations*" section of this book. The Act was due to come into force on July 1st, 1915, but has not yet been put into operation.

Legislation relating to Wireless Telegraphy does not date back further than the year 1903, although four years earlier (in 1899) the Marconi system had reached a point of development sufficiently advanced for the British Admiralty to think it desirable to obtain sets of the apparatus for trial, and two years later (in 1901) an agreement of a limited nature was entered into between the Admiralty and the Company for the supply of Marconi apparatus. In July, 1903, a further and more complete agreement was concluded. At that time the increasing use of Wireless Telegraphy for maritime purposes throughout the world had raised questions of international interest and circumstances had clearly demonstrated that international agreement was desirable with regard to many points dealing with the interchange of messages through the newly-established medium.

A conference met at Berlin in August, 1903, on the invitation of the German Government. As a result of that conference all the Powers, with the exception of Great Britain and Italy, agreed

to certain proposals, to be considered at a subsequent conference, for the international regulation of Wireless Telegraphy. The British delegates had been instructed to maintain an attitude of reserve owing to the position in which Wireless Telegraphy was placed in the United Kingdom, the fact being that in the state of the law at that time the Government had not sufficient control over Wireless Telegraphy to enable them to give effect to the provisions of the Convention. The Wireless Telegraphy Act, which was passed in 1904 for two years only, and which was renewed in 1906 without modification (and is still in force), prohibits the installation or working of wireless telegraph apparatus in the United Kingdom, or on board British ships, except under licence from the Postmaster-General. Its principal objects were, by means of systematic regulations, to make Wireless Telegraphy more useful for purposes of defence and general communication. The memorandum which was laid before the House of Commons in explanation of the Bill stated that the necessity for legislation depended, firstly, on the importance from the naval point of view of giving the Government control over wireless stations in time of war or emergency; and, secondly, on the desirability of placing the Government in such a position as to have the power of entering into an agreement on the subject with other countries if it should be found expedient to do so.

In October, 1906, a second International Conference was held in Berlin, and its primary objects may be classified under the following headings :—(1) The acceptance and transmission of telegrams. (2) The adoption of rules of working. (3) The provision of means of collecting charges and settling accounts between the different countries. (4) Arrangements for the publication of all information necessary for inter-communication. (5) Rules to prevent interference and confusion in working, with adequate provisions for enforcement. (6) Provision that, with certain exceptions, inter-communication must not be refused on account of the differences in the systems of Wireless Telegraphy employed.

The documents signed at Berlin on November 3rd, 1906, consisted of :—(*a*) The Convention; (*b*) the Additional Undertaking; (*c*) the Final Protocol; (*d*) the Service Regulations. These documents were revised at the London Convention held in 1912, and the Radiotelegraphic Convention which came into operation on July 1st, 1913, is printed *in extenso* in the following pages.

At the outbreak of the present war immediate steps were taken by the Governments of the belligerent countries to bring the use of Wireless Telegraphy under direct official control, and

all stations not operated under Government supervision were ordered by the respective Governments to be dismantled.

This action, as might well have been expected, did not stop at the belligerent countries, but extended to neutral Governments almost all over the world. It was necessary that steps should be taken by non-belligerent powers to ensure that their neutrality obligations were not violated by the utilisation of wireless stations in their territory for the transmission of communications of a non-neutral character. Consequently, almost all countries throughout the world issued special regulations relating to the use of Wireless Telegraphy; but as these regulations were all made with the same object in view they naturally differ but slightly from one another. In the section of this book devoted to Laws and Regulations the more important of these regulations have been reprinted.

The central agency established for the purpose of collecting and distributing information in accordance with the requirements of the International Radiotelegraphic Convention is commonly known as the "Berne Bureau." This is merely a branch of the Bureau of the International Telegraph Union, situated at Berne, in Switzerland. It possesses neither powers for initiating new regulations nor for dealing with those already existing; its functions are practically entirely confined to the collection and circulation of information.

Notwithstanding this, the International Bureau at Berne has become an organisation of supreme importance, thanks to the zealous, economical and efficient manner in which it is conducted. To this organisation is entrusted the work of preparing and circulating, in accordance with Article 13 of the Convention, particulars regarding every station located in countries adhering to the Convention, such as their names, nationality, geographical position, call signals, normal range, wave length, nature of service performed, hours open, etc.

The normal supplementary expenses resulting from the work of the International Bureau in connection with radiotelegraphy must not exceed 80,000 francs per annum. This sum, however, does not include any special expenditure such as would be necessitated by the holding of an International Conference. For the purpose of fixing their respective contributions towards the expenses, the governing bodies of the contracting States are divided into six classes, as set forth in Article 43 of the regulations.

Despite the war at present raging, the "Berne Bureau" has continued its distribution of information.

INTERNATIONAL RADIO-TELEGRAPHIC CONVENTION

London, July 5th, 1912

International Radiotelegraphic Convention concluded between Great Britain and various British Colonies and Protectorates, the Union of South Africa, the Commonwealth of Australia, Canada, British India, New Zealand, Greece, Italy and the Italian Colonies, Germany and the German Protectorates, the United States of America and the Possessions of the United States of America, the Argentine Republic, Austria, Hungary, Bosnia-Herzegovina, Belgian Congo, Brazil, Bulgaria, Chili, Denmark, France and Algeria, French West Africa, French Equatorial Africa, Indo-China, Madagascar, Tunis, Japan and Chosen, Formosa, Japanese Sakhalin and the Leased Territory of Kwantung, Morocco, Monaco, Norway, the Netherlands, the Dutch Indies and the Colony of Curaçao, Persia, Portugal and the Portuguese Colonies, Roumania, Russia and the Russian Possessions and Protectorates, the Republic of San Marino, Siam, Spain, Sweden, Turkey and Uruguay.

The undersigned Plenipotentiaries of the Governments of the countries enumerated above, being assembled in Conference in London, have, by mutual consent, and subject to ratification, concluded the following Convention :—

ARTICLE 1.

The High Contracting Parties undertake to apply the provisions of the present Convention at all the radiotelegraph stations (coast stations and ship stations) which are established or worked by the Contracting Parties and open for the service of public correspondence between the land and ships at sea.

They undertake, moreover, to impose the observance of these provisions upon private enterprises authorised either to establish or to work radiotelegraphic coast stations open to the service of public correspondence between the land and ships at sea, or to establish or to work radiotelegraphic stations whether open for public correspondence or not on board the ships which carry their flag.

ARTICLE 2.

The term coast station means radiotelegraphic station established on land or on board any ship permanently anchored and used for the exchange of correspondence with ships at sea.

The term ship station means any radiotelegraphic station established on board a ship other than a permanently moored ship.

ARTICLE 3.

Coast stations and ship stations are bound to exchange radiotelegrams reciprocally without regard to the radiotelegraph system adopted by such stations.

Each ship station is bound to exchange radiotelegrams with any other ship station without distinction as to radiotelegraphic system adopted by such stations.

Nevertheless, in order not to impede scientific progress, the provisions of the present Article do not prevent the contingent employment of a radiotelegraphic system incapable of communicating with other systems, provided that such incapacity be due to the specific nature of such system and that it be not caused by devices adopted solely with the object of preventing intercommunication.

ARTICLE 4.

Notwithstanding the provisions of Article 3, a station may be appropriated to a restricted public service determined by the object of the correspondence or by other circumstances independent of the system employed.

ARTICLE 5.

Each of the High Contracting Parties undertakes to cause the coast stations to be connected with the telegraph system by means of special wires, or, at least, to take such other measures as will ensure a rapid exchange between the coast stations and the telegraph system.

ARTICLE 6.

The High Contracting Parties shall mutually notify one another of the names of the coast stations and ship stations covered by Article 1, as well as of all the particulars necessary to facilitate and accelerate the radiotelegraphic exchanges as specified in the Detailed Regulations.

ARTICLE 7.

Each of the High Contracting Parties reserves to itself the right to prescribe or to permit in the stations covered by

Article 1—independently of the installation of which the particulars are published conformable to Article 6—the installation and working of other arrangements designed for special radiotelegraphic transmission without publication of the details of such devices.

Article 8.

The working of radiotelegraphic stations shall be organised as far as possible in such a manner as not to interfere with the working of other stations of the kind.

Article 9.

Radiotelegraphic stations shall be obliged to accept with absolute priority calls of distress from whatever source, to reply in like manner to such calls, and to give the effect to them which they require.

Article 10.

The charge for a radiotelegram shall include, according to the circumstances :—

1. *(a)* The "coast charge" which accrues to the coast station.
   (b) The "ship charge" which accrues to the ship station.
2. The charge for transmission over the lines of the telegraph system, calculated in accordance with the ordinary rules.
3. The transit charges of the intermediate coast or ship stations and the charges appertaining to special services required by the sender.

The rate of the coast charge shall be subject to the approval of the Government to whose authority the coast station is subject, and the rate of the ship charge to the approval of the Government to which the ship belongs.

Article 11.

The provisions of the present Convention are completed by Detailed Regulations which have the same validity and come into force at the same time as the Convention.

The provisions of the present Convention and of the Regulations relating thereto may be modified at any time by mutual consent of the High Contracting Parties. Conferences of Plenipotentiaries having power to modify the Convention and the Regulations shall take place periodically; each Conference shall itself fix the place and time of the succeeding Conference.

ARTICLE 12.

These Conferences shall be composed of Delegates of the Governments of the Contracting Parties.

In the deliberations each country shall have one vote only.

If a Government adhere to the Convention for its colonies, possessions or protectorates, subsequent Conferences may determine that the whole or part of such colonies, possessions or protectorates is to be regarded as forming a country for the purposes of the foregoing clauses. But the number of votes to be exercised by a Government, including its colonies, possessions or protectorates, may not exceed six.

The following are regarded as forming a single country for the purposes of the present Article :—

The Union of South Africa.
The Australian Commonwealth.
Canada.
British India.
New Zealand.
German East Africa.
German South-West Africa.
The Cameroons.
Togoland.
The German Pacific Protectorates.
Alaska.
Hawaii and the other American possessions in Polynesia.
The Philippine Islands.
Porto Rico and the American possessions in the Antilles.
The zone of the Panama Canal.
The Belgian Congo.
The Spanish Colony of the Gulf of Guinea.
French West Africa.
French Equatorial Africa.
Indo-China.
Madagascar.
Tunisia.
Erythrea.
Italian Somaliland.
Chosen, Formosa, Japanese Sakalin and the leased territory of Kwantung.
The Dutch Indies.
The Colony of Curaçao.
Portuguese West Africa.

Portuguese East Africa and the Portuguese possessions in Asia.
Russian Central Asia (littoral of the Caspian Sea).
Bokhara.
Khiva.
Western Siberia (littoral of the Arctic Ocean).
Eastern Siberia (littoral of the Pacific Ocean).

Article 13.

The International Bureau of the Telegraph Union shall be entrusted with the duty of collecting, co-ordinating, and publishing information of every kind relating to radiotelegraphy; of circulating in proper form proposals for the modification of the Convention, and of the Regulations; of notifying the changes adopted, and, generally, of carrying out any Administrative work which it may be called upon to undertake in the interests of International Radiotelegraphy.

The expenses of this institution shall be borne by all the Contracting Parties.

Article 14.

Each of the High Contracting Parties reserves to itself the right to fix the conditions under which it will admit radiotelegrams coming from or destined for a station, whether a ship station or a coast station, which is not subject to the provisions of the present Convention.

If a radiotelegram is admitted, the ordinary charges must be applied to it.

Every radiotelegram originating at a ship station and received by a coast station of the contracting country, or accepted in transit by the Administration of a contracting country, shall be sent forward.

Every radiotelegram intended for a ship shall also be sent forward if the Administration of the contracting country has accepted it from the sender, or if the Administration of a contracting country has accepted it in transit from a non-contracting country, subject to the right of the coast station to refuse transmission to a ship station belonging to a non-contracting country.

Article 15.

The provisions of the Articles 8 and 9 of this Convention are equally applicable to radiotelegraphic installations other than those indicated in Article 1.

Article 16.

Governments which have not taken part in the present Convention shall be allowed to become party to it at their own request.

Such adherence shall be notified through diplomatic channels to that one of the contracting Governments in whose territory the last Conference was held, and by that Government to the others.

Such adherence shall involve complete acceptance of all the clauses of the present Convention and admission to all the advantages stipulated therein.

The adherence to the Convention of the Government of a country having colonies, possessions, or protectorates shall not carry with it the adherence of the colonies, possessions, or protectorates of such Government, unless a declaration be made to that effect by such Government. These colonies, possessions, or protectorates as a whole, or each one of them separately, may form the subject of a separate adherence or of a separate denunciation under the conditions indicated in the present Article and in Article 22.

Article 17.

The provisions of Articles 1, 2, 3, 5, 6, 7, 8, 11, 12, and 17, of the International Telegraph Convention of St. Petersburg dated 10/22 July 1875 shall be applicable to International Radiotelegraphy.

Article 18.

In cases of difference of opinion between two or more contracting Governments concerning the interpretation or the execution either of the present Convention or of the Regulations provided for by Article 11, the question at issue may, by mutual consent, be submitted to arbitration. In that event each of the Governments concerned shall choose another not interested in the question.

The decision of the Arbitrators shall be made by an absolute majority of votes.

In the event of an equality of votes, the Arbitrators shall appoint, in order to settle the difficulty, another Contracting Government not concerned in the question in dispute. In default of an agreement with regard to such choice, each Arbitrator shall propose a Contracting Government not interested in the dispute; and lots shall be drawn as between the Governments proposed.

The drawing of lots shall be the prerogative of the Government in whose territory the International Bureau provided for in Article 13 performs its work.

ARTICLE 19.

The High Contracting Parties undertake to adopt or to propose to their respective legislatures the measures necessary to ensure the execution of the present Convention.

ARTICLE 20.

The High Contracting Powers shall communicate to one another such laws as may have been already enacted or which may be about to be so enacted in their countries, relating to the subject of the present Convention.

ARTICLE 21.

The High Contracting Parties maintain their entire liberty concerning the radiotelegraphic installations not covered by Article 1, and particularly with regard to naval and military installations, and also to stations carrying out communications between fixed points. All such installations and stations shall remain subject solely to the obligations provided for in Articles 8 and 9 of the present Convention.

Nevertheless when these installations and stations carry out an exchange of maritime public correspondence, they shall conform, in carrying out such service, to the requirements of the Regulations so far as concerns the method of transmission and accounting.

If, on the other hand, coast stations carry out, at the same time as public correspondence with ships at sea, communications between fixed points, they shall not be subject, in the execution of this latter service, to the provisions of the Convention, except as to the observance of Articles 8 and 9 of this Convention.

However, fixed stations which carry out correspondence between land and land must not refuse the exchange of radiotelegrams with another fixed station on account of the system adopted by such station; nevertheless, the liberty of each country shall remain complete in respect of the organisation of the service for correspondence between fixed points and the decision as to the correspondence to be carried out by the stations appropriated to such service.

ARTICLE 22.

The present Convention shall come into execution on and from the 1st of July 1913, and shall remain in force for an inde-

terminable period and until the expiry of one year from the day upon which it is denounced.

Denunciation shall only take effect as regards the Government in whose name it is made. So far as the other Contracting Parties are concerned, the Convention shall remain in force.

ARTICLE 23.

The present Convention shall be ratified, and the ratification thereof shall be deposited in London with as little delay as possible.

If one or more of the High Contracting Parties shall not ratify the Convention, it shall not be less valid thereby for the Parties which have ratified it.

In witness whereof the respective Plenipotentiaries have signed the Convention in a single copy, which shall remain deposited in the archives of the British Government, and of which a copy shall be sent to each Party.

London, the 5th of July, 1912.

FINAL PROTOCOL.

At the time of proceeding to the signature of the Convention adopted by the International Radiotelegraphic Conference of London, the undersigned Plenipotentiaries have agreed as follows :—

I.

The exact nature of the adherence notified on the part of Bosnia-Herzegovina not being yet determined, it is recognised that Bosnia-Herzegovina is entitled to a vote, a decision at a later date being necessary on the question whether this vote belongs to Bosnia-Herzegovina in virtue of the second paragraph of Article 12 of the Convention, or whether this vote is accorded to it conformably to the provisions of the third paragraph of that Article.

II.

The following declaration is placed on record :—

The Delegation of the United States declares that its Government is under the necessity of abstaining from all action with regard to tariffs, because the transmission of radiotelegrams as well as of telegrams in the United States is undertaken, wholly or in part, by commercial or private companies.

III.

The following declaration was also placed on record :—

The Government of Canada reserves to itself the right to fix

separately, for each of its coast stations, a total sea charge for radiotelegrams originating from North America and intended for any ship whatever, the coast charge amounting to three-fifths and the ship charge to two-fifths of such total charge.

In witness whereof the respective Plenipotentiaries have drawn up the present Final Protocol, which shall have the same force and the same validity as if the provisions thereof had been inserted in the text itself of the Convention to which it belongs, and they have signed it in a single copy which shall remain deposited in the archives of the British Government, and of which a copy shall be sent to each party.

London, the 5th of July, 1912.

SERVICE REGULATIONS ANNEXED TO THE INTERNATIONAL RADIOTELEGRAPHIC CONVENTION.

Contents.

I.—ORGANISATION OF RADIOTELEGRAPHIC STATIONS.

1.

The choice of radiotelegraphic apparatus and devices to be used by coast stations and ship stations is free. The installation

of these stations must, as far as possible, be in keeping with scientific and technical progress.

II.

Two wave-lengths, one of 600 and the other of 300 metres, shall be admitted for the service of general public correspondence. Every coast station open to this service must be equipped in such a way as to be able to use these two wave-lengths, of which one shall be designated as the normal wave-length of the station. During the whole time that it is open every coast station must be in a position to receive calls made by means of its normal wave-length. Nevertheless, for the correspondence covered by paragraph 2 of Regulation XXXV., use shall be made of a wave-length of 1,800 metres. Further, each Government may authorise the use, in a coast station, of other wave-lengths for the purpose of securing a long-range service or a service other than that of general public correspondence, and established in conformity with the provisions of the Convention, with the reservation that these wave-lengths do not exceed 600 metres, or that they do exceed 1,600 metres.

In particular, stations used exclusively for the despatch of signals intended to determine the position of ships must not use wave-lengths exceeding 150 metres.

III.

1. Every ship station must be equipped in such a way as to be able to use the wave-lengths of 600 metres and of 300 metres. The first shall be the normal wave-length, and may not be exceeded in transmission, the case of Regulation XXXV. (paragraph 2) excepted.

Use may be made of other wave-lengths not exceeding 600 metres in special cases, and subject to the approval of the Administrations to which the coast stations and ship stations concerned are subject.

2. During the whole time that it is open every ship station must be able to receive calls made by means of its normal wave-length.

3. Ships of small tonnage, in the case of which it would be materially impossible to use the wave-length of 600 metres for transmission, may be authorised to employ exclusively the wave-length of 300 metres; they must be able to receive by means of the wave-length of 600 metres.

IV.

Communications between a coast station and a ship station, or between two ship stations, must be exchanged on both sides by means of the same wave-length. If, in a particular case, communication is difficult, the two stations may, by mutual consent, pass from the wave-length by means of which they are communicating to the other regulation wave-length. Both stations shall resume their normal wave-lengths when the radiotelegraphic exchange is finished.

V.

1. The International Bureau shall prepare, publish and revise periodically an official map showing the coast stations, their normal ranges, the principal lines of navigation, and the time normally taken by ships for the voyage between the various ports of call.

2. It shall draw up and publish a Nomenclature of the radiotelegraphic stations covered by Article I. of the Convention, and also periodical supplements for additions and modifications. This Nomenclature shall give, in the case of each station, the following information :—

1st.—For coast stations: the name, nationality, and geographical position indicated by the territorial sub-division and by the longitude and latitude of the place; for ship stations: the name and nationality of the ships; when the case arises, the name and address of the contractor.

2nd.—The call signal. (The call signals must be differentiated from one another, and each one must consist of a group of three letters.)

3rd.—The normal range.

4th.—The radiotelegraphic system with the characteristics of the system of discharge (musical sparks, tone expressed by the number of double vibrations, etc.).

5th.—The wave-lengths used (the normal wave-length to be underlined).

6th.—The nature of the services performed.

7th.—The hours of working.

8th.—When necessary the hour and method of despatch of time signals and meteorological telegrams.

9th.—The coast or ship charge.

3. There shall also be included in the Nomenclature such information relating to radiotelegraphic stations other than those

covered by Article 1 of the Convention, as shall be communicated to the International Bureau by the Administrations to which such stations are subject, provided that these are either Administrations which are parties to the Convention, or, if they are not parties to it, have made the declaration provided for in Regulation XLVIII.

4. The following notations shall be adopted in documents for the use of the international service to designate radiotelegraph stations :—

PG—station open for general public correspondence.
PR—station open for restricted public correspondence.
P—private station.
O—station open only for official correspondence.
N—station always open.
X—station not having fixed working hours.

5. The name of a ship station indicated in the first column of the Nomenclature must be followed, when there is duplication of the name, by the call-signal of such station.

VI.

The exchange of unnecessary signals and words is forbidden to the stations covered by Article 1 of the Convention. Experiments and practice shall not be allowed in these stations, except so far as they do not disturb the service of other stations.

Practice must be carried out with wave-lengths different from those allowed for public correspondence, and with the minimum of power necessary.

VII.

1. All stations are bound to exchange traffic with the minimum of energy necessary to ensure good communication.

2. Every coast and ship station must comply with the following conditions :—

(*a*) The waves emitted must be as pure and as little damped as possible.

In particular, the use of transmitting devices in which the production of the waves emitted is obtained by discharging the aerial direct by sparks (plain aerial) shall not be allowed except in cases of distress.

It may, however, be allowed in the case of certain special stations (for example those of small ships) in which the primary power does not exceed 50 watts.

(*b*) The apparatus must be capable of transmitting and

receiving at a speed at least equal to 20 words per minute, the word being reckoned at the rate of five letters.

New installations bringing into play an energy of more than 50 watts shall be equipped in such a way that it may be possible to obtain easily several ranges less than the normal range, the shortest being of approximately 15 nautical miles. Installations already established bringing into play an energy of more than 50 watts shall be transformed as far as possible in such a manner as to satisfy the foregoing requirements.

(*c*) Receiving apparatus must allow of receiving, with the greatest possible amount of protection from disturbance, transmissions made with the wave-lengths specified in present Regulations, up to 600 metres.

3. Stations serving solely for determining the position of ships (*radiophares*) must not operate over an area of greater radius than 30 nautical miles.

VIII.

Independently of the general conditions specified in Regulation VII., ship stations must also satisfy the following conditions:—

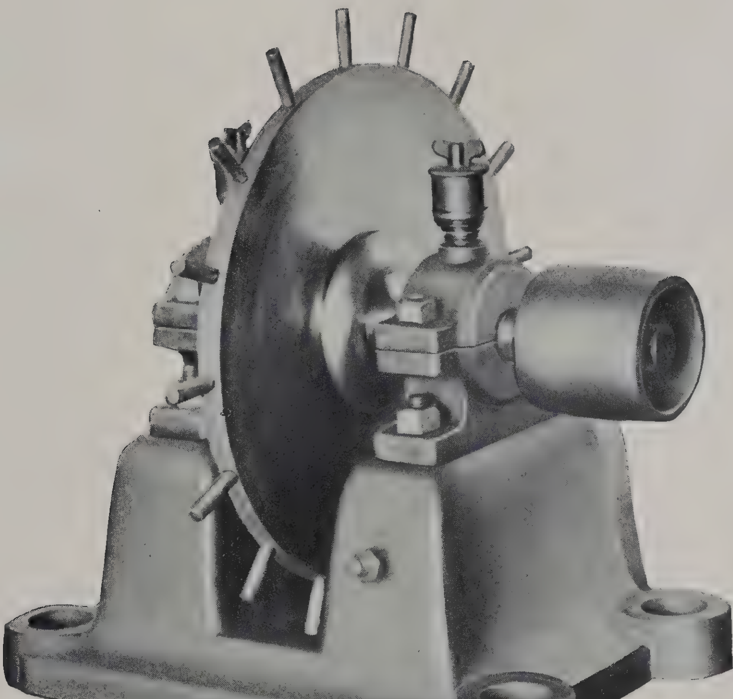
(*a*) The power transmitted to the radiotelegraphic apparatus, measured at the terminals of the generator of the station, must not under normal circumstances exceed one kilowatt.

(*b*) Subject to the provisions of Regulation XXXV., par. 2, a power exceeding one kilowatt may be used, if the ship is under the necessity of corresponding at a distance of more than 200 nautical miles from the nearest coast station, or if, in consequence of exceptional circumstances, communication cannot be realised except by means of an increase of power.

IX.

1. No ship station may be established or worked by private enterprise without a licence issued by the Government to which the ship is subject.

Stations on board ship having their port of register in a colony, possession, or protectorate may be described as being subject to the authority of such colony, possession, or protectorate.



EARLY FORM OF DISC DISCHARGER WITH RADIAL TEETH.

[*To face page* 48.

2. Every ship station holding a licence issued by one of the contracting Governments must be regarded by the other Governments as having an installation fulfilling the conditions imposed by the present Regulations.

The competent authorities of the countries where the ship calls may demand the production of the licence. In default of such production, these authorities may ascertain whether the radiotelegraph installations of the ship satisfy the conditions imposed by the present Regulations.

When an Administration has practical evidence that a ship station is not fulfilling these conditions, it must, in every case, address a complaint to the Administration of the country to which the ship is subject. From that point onwards the procedure shall be, when necessary, as provided in Regulation XII., paragraph 2.

X.

1. The service of the ship station must be carried out by a telegraphist holding a certificate issued by the Government to which the ship is subject, or, in an emergency and for one voyage only, by another Government party to the convention.

2. There shall be two classes of certificates:

The first-class certificate shall state the professional qualifications of the operator with regard to:—

(*a*) the adjustment of the apparatus and knowledge of their working;

(*b*) transmitting and receiving by ear, at a speed which must not be less than 20 words per minute.

(*c*) knowledge of the regulations applying to the exchange of radiotelegraphic communications.

The second-class certificate may be issued to a telegraphist who only attains to a speed in transmitting and receiving of 12 to 19 words per minute, but who fulfils the other conditions mentioned above. Telegraphists holding a second-class certificate may be allowed:—

(*a*) on ships only using radiotelegraphy for their own service and for the correspondence of the ship's company, in particular on fishing vessels;

(*b*) on all ships as substitutes, provided that such ships have on board at least one operator holding a first-class certificate. Nevertheless, on ships placed in the first class indicated in Reg. XIII., the service must be carried

out by at least two telegraphists holding first-class certificates.

In ship stations, transmissions may only be made by a telegraphist holding a first or second-class certificate, an exception being made of cases of emergency, in which it would be impossible to conform to this provision.

3. Further, the certificate shall testify that the Government has placed the telegraphist under the obligation of preserving the secrecy of correspondence.

4. The radiotelegraph service of the ship station shall be placed under the supreme authority of the captain of the ship.

XI.

Ships provided with radiotelegraph installations and placed in the first two classes indicated in Reg. XIII. shall be bound to have emergency radiotelegraph installations of which all the parts shall be placed in conditions of the greatest safety possible, such conditions to be determined by the Government which issues the licence. These emergency installations must have at command a source of power of their own, must be capable of being set working speedily, must be able to work for six hours at least, and must have a minimum range of 80 nautical miles in the case of ships in the first class, and of 50 miles in the case of those of the second class. This emergency installation shall not be required in the case of ships whose ordinary installation fulfils the conditions of the present article.

XII.

1. If an Administration has information of a breach of the Convention or of the Regulations committed in one of the stations which it has authorised, it shall ascertain the facts and fix the responsibility.

In the case of ship stations, if the responsibility rests on the operator, the Administration shall take the necessary steps, and, if necessary, shall withdraw the certificate. If it is shown that the breach was due to the condition of the apparatus or to instructions given to the telegraphist, the same procedure shall be followed in respect of the licence issued to the ship.

2. In the event of repeated breaches by the same ship, if the representations made to the Administration to which the ship is subject, by another Administration, remain without effect, the latter shall have the right, after notice given, of authorising its coast stations not to accept communications coming from the ship

in question. In case of a difference between the two Administrations, the question shall be submitted to Arbitration on the request of one of the Governments concerned. The procedure is indicated in Article XVIII. of the Convention.

II.—HOURS OF SERVICE OF STATIONS.

XIII.

(a) *Coast Stations.*

1. The service of coast stations shall be, as far as possible, permanent, day and night, without interruptions.

Nevertheless certain coast stations may have a service of limited duration. Each Administration shall fix the hours of service.

2. Coast stations whose service is not permanent may not close before having transmitted all their radiotelegrams to the ships which are in their radius of action nor before having received from such ships all the radiotelegrams of which notice has been given. This provision shall also apply when ships notify their presence before work has actually ceased.

(b) *Ship Stations.*

3. Ship stations shall be placed in three classes :—

1st, stations always open;
2nd, stations having limited working hours;
3rd, stations having no fixed working hours.

During navigation, the following must remain permanently on the watch: 1st, ships of the first class; 2nd, those of the second class, during the hours that they are open for service; out of these hours, the latter stations must remain on the watch for the first 10 minutes of each hour. The stations of the third class are not bound to perform any regular "listening" service.

It shall fall to the Governments which issue the licences specified in Article IX. to fix the class in which the ship is to be placed, in respect of its obligations in the matter of keeping watch. This classification shall be mentioned in the licence.

III.—DRAWING UP AND HANDING IN OF RADIO-TELEGRAMS.

XIV.

1. Radiotelegrams shall bear, as the first word of the preamble, the service instructions "radio."

2. In the transmission of radiotelegrams coming from a ship

at sea, the date and the hour of the handing in at the ship station shall be indicated in the preamble.

3. On forwarding over the telegraph system, the coast station shall insert, as the indication of the office of origin, the name of the ship of origin as it appears in the Nomenclature, and also, when the case arises, that of the last ship which served as an intermediary. These particulars shall be followed by the name of the coast station.

XV.

1. The address of radiotelegrams intended for ships must be as complete as possible. It shall be compulsorily drawn up as follows:—

(*a*) Name or title of the addressee, with supplementary particulars if necessary.

(*b*) Name of the ship, as it appears in the first column of the Nomenclature.

(*c*) Name of the coast station, as it appears in the Nomenclature.

Nevertheless the name of the ship may be replaced, at the risks and perils of the sender, by the particulars of the voyage taken by such ship and determined by the names of the ports of origin and destination or by any other equivalent particulars.

2. In the address, the name of the ship, as it appears in the first column of the Nomenclature, shall be counted in every case, and independently of its length, as one word.

3. Radiotelegrams drawn up by means of the International Signal Code shall be forwarded to their destination without being de-coded.

IV.—CHARGES.

XVI.

1. The coast charge and the ship charge shall be fixed in accordance with the tariff per word pure and simple, on the basis of a fair remuneration for radiotelegraphic work, with optional application of a minimum charge per radiotelegram.

The coast charge may not exceed 60 centimes per word, nor the ship charge 40 centimes per word. Nevertheless each Administration shall have the right to authorise coast and ship charges higher than these maxima in the case of stations having a range of more than 400 nautical miles, or if stations exceptionally onerous on account of the material conditions of their installation or working.

The optional minimum charge per radiotelegram may not exceed the coast or ship charge for a radiotelegram of 10 words.

2. In the case of radiotelegrams originating from or intended for a country or exchanged directly with the coast stations of that country, the charge applying to the transmission over the lines of the telegraph system must not exceed, on the average, that of the inland rate of that country.

This charge shall be reckoned per word pure and simple, with an optional minimum charge not exceeding the charge for 10 words. It shall be notified in francs by the Administration of the country to which the coast station is subject.

In the cases of countries in the European system, with the exception of Russia and Turkey, there shall only be a single charge for the territory of each country.

XVII.

1. When a radiotelegram originating from a ship and intended for *terra firma* passes through one or two ship stations, the charge shall include, in addition to those of the ship of origin, the coast station, and the telegraph system, the ship charge of each of the ships taking part in the transmission.

2. The sender of a radiotelegram originating from *terra firma* and intended for a ship may require that his message be transmitted by way of one or two ship stations; he shall deposit for this purpose the amount of the radiotelegraphic and telegraphic charges, and besides, as a deposit, a sum to be fixed by the office of origin with a view to the payment to the intermediate ship stations of the transit charges fixed in paragraph 1; he must further pay, as he may choose, either the charge for a telegram of five words or the cost of postage of a letter to be sent by the coast station to the office of origin giving the information necessary to the liquidation of the sum deposited

The radiotelegram shall then be accepted at the risks and perils of the sender; it shall bear before the address the paid additional particulars "x retransmissions telegraphe" or "x retransmissions lettre" (x representing the number of retransmissions required by the sender) accordingly as the sender desires that the information necessary for the liquidation of the deposit be furnished by telegram or by letter.

3. The charge for radiotelegrams originating from a ship, intended for another ship, and sent by way of one or two intermediate coast stations, shall include:—

The ship charges of both ships, the charge of the coast

station or the two coast stations, as the case may be, and when necessary the telegraph charge appropriate to the transit between the two coast stations.

4. The charge for radiotelegrams exchanged between ships without the aid of a coast station includes the ship charges of the ship of origin and of the ship of destination, with the ship charges of the intermediate stations added thereto.

5. The coast and ship charges due to the stations of transit shall be the same as those fixed for such stations when these are stations of origin and destination. In no case shall they be collected more than once.

6. In the case of any intermediate coast station, the charge to be collected for the transit service shall be the highest of the coast charges appertaining to the direct exchange with the two ships in question.

XVIII.

The country in whose territory is established a coast station acting as intermediary for the exchange of radiotelegrams between a ship station and another country shall be regarded, for the purpose of applying telegraphic charges, as the country of origin or of destination of such radiotelegrams and not as the country of transit.

V.—COLLECTION OF CHARGES.

XIX.

1. The total charge for radiotelegrams shall be collected from the sender, with the exception—1st, of the cost of express delivery (Article LVIII., paragraph 1, of the Telegraph Regulations); 2nd, of the charges applying to inadmissible joinings or alterations of words noted by the office or station of destination (Article XIX., paragraph 9, of the Telegraph Regulations), these charges being collected from the addressee.

Ship stations must possess the necessary tariffs for this purpose. They shall have, however, the right to obtain information from coast stations with regard to charges for radiotelegrams for which they do not possess all the necessary information.

2. The counting of words by the office of origin shall be decisive in the case of radiotelegrams addressed to ships, and that of the ship station of origin shall be decisive in the case of radiotelegrams originating in ships, both for the purpose of transmission and for that of the international accounts. Nevertheless when the radiotelegram is worded wholly or in part either

in one of the languages of the country of destination, in the case of radiotelegrams originating in ships, or in one of the languages of the country to which the ship belongs, in the case of radiotelegrams addressed to ships, and when the radiotelegram contains joinings or alterations of words contrary to the common use of that language, the office or ship station of destination, as the case may be, shall have the right to recover from the addressee the amount of the charge not collected. In the case of a refusal to pay the radiotelegram may be withheld.

VI.—TRANSMISSION OF RADIOTELEGRAMS.

(a) *Signals of Transmission.*

XX.

The signals employed shall be those of the International Morse Code.

XXI.

Ships in distress shall make use of the following signal,

. . . — — — . . .

repeated at short intervals, followed by the necessary particulars.

As soon as a station hears the signal of distress, it must suspend all correspondence and must not resume the same until after it has made sure that the communication consequent upon the call for help is finished.

The stations which hear a call of distress must act according to indications given by the ship which makes the call, with regard to the order of messages or their cessation.

When, at the end of a series of distress calls, there is added the call signal of the particular station, the reply to the call is proper to that station only, unless that station does not reply. Failing the indication of a particular station in the call for help, every station that hears the call shall be bound to reply thereto.

XXII.

For the purpose of giving or asking information concerning the radiotelegraph service, stations must make use of the signals contained in the list appended to the present Regulations. (See p. 73.)

(b) *Order of Transmission.*

XXIII.

Between two stations, radiotelegrams of the same class shall be transmitted singly in alternate order or by series of several radiotelegrams, according to the instructions given by the coast

station, on condition that the duration of the transmission of each series do not exceed 15 minutes.

(c) *Calling of Stations and Transmission of Radiotelegrams.*

XXIV.

1. As a general rule, it shall be the ship station that calls the coast station, whether it has radiotelegrams to transmit or not.

2. In waters where the radiotelegraphic traffic is congested (the Channel, etc.), the call of a ship to a coast station may not, as a general rule, be made unless the latter is within the normal range of the ship station and the ship station has approached to a distance less than 75 per cent. of the normal range of the coast station.

3. Before proceeding to make a call, the coast station or the ship station must adjust its receiving system to the highest possible degree of sensitiveness, and must make sure that no other communication is being made within its radius of action; if it is otherwise, it shall await the first break, unless it finds that its call is not likely to disturb the communication in progress. The same applies when the station wishes to answer a call.

4. For making a call, every station shall use the normal wave of the station to be called.

5. If, in spite of these precautions, a radiotelegraphic transmission be impeded, the call must cease on the first request made by a coast station open to public correspondence. This station must then indicate the approximate duration of the wait.

6. The ship station must make known to each coast station to which it has notified its presence the time at which it proposes to cease its operations, and also the probable duration of the interruption.

XXV.

1. The call comprises the signal — . — . —, the call signal of the station called, sent three times, and the word "de," followed by the call signal of the sending station, sent three times.

2. The station called shall reply by giving the signal — . — . —, followed by the call signal, sent three times, of the calling station, by the word "de" its own call signal and the signal — . —

3. Stations which wish to enter into communication with ships, without, however, knowing the names of those ships which are within their radius of action, may use the signal

— . — . — — . — (signal of enquiry). The provisions of paragraphs 1 and 2 are also applicable to the transmission of the signal of enquiry and to the reply to that signal.

XXVI.

If a station when called does not reply when the call (Regulation XXV.) has been sent three times at intervals of 2 minutes, the call may not be resumed until after an interval of 15 minutes, the station making the call first making sure of the fact that no radiotelegraphic communication is in progress.

XXVII.

Every station which has to make a transmission necessitating the use of high power shall first send out three times the warning signal — — . . — —, with the minimum of power necessary to reach the neighbouring stations. It shall not then begin to transmit with the high power until 30 seconds after sending the warning signal.

XXVIII.

1. As soon as the coast station has replied, the ship station shall furnish it with the following information if it has messages to transmit to it; this information shall also be given when the coast stations ask for it :—

(*a*) The approximate distance, in nautical miles, of the vessel from the coast station;

(*b*) The position of the ship given in a concise form and adapted to the circumstances of the individual case;

(*c*) The next port at which the ship will touch;

(*d*) The number of radiotelegrams if they are of normal length or the number of words if the messages are of exceptional length.

The speed of the ship in nautical miles shall be given specially at the express request of the coast station.

2. The coast station shall reply giving, as provided in paragraph 1, either the number of telegrams or the number of words to be transmitted to the ship and also the order of transmission.

3. If transmission cannot take place immediately the coast station shall inform the ship station of the approximate length of the wait.

4. If a ship station when called cannot receive for the moment it shall inform the calling station of the approximate length of the wait.

5. In the case of exchanges between two ship stations it shall rest with the station called to fix the order of transmission.

XXIX.

When a coast station is called by several ship stations, it shall decide the order in which these stations shall be allowed to exchange their messages.

In the regulation of this order, the coast station shall be guided solely by the necessity for allowing every station concerned to exchange the greatest possible number of radiotelegrams.

XXX.

Before beginning to exchange correspondence, the coast station shall inform the ship station whether the transmission is to be made in alternate order by series (Regulation XXIII.); it shall then begin to transmit, or shall follow up these instructions by the signal — . —

XXXI.

The transmission of a radiotelegram shall be preceded by the signal — . — . — and ended by the signal . — . — . followed by the call signal of the sending station and by the signal — . —

In the case of a series of radiotelegrams, the call-letter of the sending station and the signal — . — shall only be given at the end of the series.

XXXII.

When the radiotelegram to be transmitted contains more than 40 words, the sending station shall interrupt the transmission by the signal . . — — . . after each series of 20 words or thereabouts, and it shall not resume transmission until after having obtained from the station in correspondence the repetition of the last word clearly received, followed by the said signal, or, if the reception is clear, the signal — . —

In the case of transmission in series, the acknowledgment of receipt shall be given after each radiotelegram.

Coast stations engaged in transmitting long radiotelegrams must suspend transmission at the end of each period of 15 minutes, and must remain silent during a period of 3 minutes before continuing transmission.

Coast and ship stations which work in the conditions laid down in Regulation XXXV., paragraph 2, must suspend work at the end of each period of 15 minutes, and keep watch on the wave-length

of 600 metres during a period of 3 minutes before continuing transmission.

XXXIII.

1. When the signals become doubtful, all possible resources must be drawn upon to accomplish transmission. To this end, the radiotelegram shall be transmitted three times at most, at the request of the receiving station. If in spite of this triple transmission the signals are still unintelligible, the radiotelegram shall be cancelled.

If the acknowledgment of receipt does not come to hand, the sending station shall again call the station with which it is in correspondence. When no reply is made after three calls, the transmission shall not be persevered with. In such case, the sending station shall have the right to obtain the acknowledgment of receipt through the medium of another radiotelegraph station, using, when necessary, the lines of the telegraph system.

2. If the receiving station considers that, in spite of defective receiving, the radiotelegram can be delivered, it shall insert at the end of the preamble the service advice "Reception douteuse" and shall forward the radiotelegram. In such case, the Administration to which the coast station is subject shall claim the charges, in conformity with Clause XLII. of the present Regulations. Nevertheless, if the ship station later on transmits the radiotelegram to another coast station of the same Administration, the latter can only claim the charges appertaining to a single transmission.

(d) *Acknowledgment of Receipt and End of Work.*

XXXIV.

1. The acknowledgment of receipt shall be given in the form prescribed by the International Telegraph Regulations; it shall be preceded by the call signal of the sending station and followed by the call signal of the receiving station.

2. The end of the work between two stations shall be indicated by each one of them by means of the signal . . . — . — followed by its own call signal.

(e) *Route to be taken by Radiotelegrams.*

XXXV.

1. As a general principle, the ship station shall transmit its radiotelegrams to the nearest coast station.

However, if the ship station has the choice between several coast stations at equal or nearly equal distances, it shall give

the preference to that which is established on the territory of the country of destination or of normal transit of its radiotelegrams.

2. Nevertheless, a sender on board a ship shall have the right to indicate the coast station by which he wishes his radiotelegram to be forwarded. The ship station shall then wait until this coast station is the nearest.

Exceptionally, transmission may be made to a more distant coast station, provided :—

(*a*) that the radiotelegram is intended for the country in which such coast station is situated and that it comes from a ship subject to that country;

(*b*) that for calls and transmission both stations use a wave length of 1,800 metres;

(*c*) that transmission by this wave-length does not disturb any transmission made, by means of the same wave-length, by a nearer coast station;

(*d*) that the ship station is more than 50 nautical miles distant from any coast station shown in the Nomenclature. The distance of 50 miles may be reduced to 25 miles, subject to the reservation that the maximum power at the terminals of the generator do not exceed 5 kilowatts and that the ship stations be established in conformity with Regulations VII. and VIII. This reduction of distance shall not apply in the seas, bays or gulfs of which the shores belong to one country only and of which the opening to the high sea is less than 100 miles wide.

VII.—DELIVERY OF RADIOTELEGRAMS.

XXXVI.

When for any cause whatsoever a radiotelegram coming from a ship at sea and intended for *terra firma* cannot be delivered to the addressee an advice of non-delivery shall be sent out. This advice shall be transmitted to the coast station which received the original radiotelegram. The latter, after verifying the address, shall forward the advice to the ship, if possible, and, if need be, by way of another coast station of the same country or of a neighbouring country.

When a radiotelegram, having arrived at the ship station, cannot be delivered, that station shall inform the office or ship station of origin by means of a service advice. In the case of radiotelegrams coming from *terra firma* this advice shall be trans-

mitted, whenever possible, to the coast station by way of which the radiotelegram passed, or, if necessary, to another coast station of the same country or of a neighbouring country.

XXXVII.

If the ship to which the radiotelegram is addressed has not notified its presence to the coast station within the time specified by the sender, or, in the absence of such specification, up to the morning of the eighth day following, such coast station shall give notice of the fact to the office of origin, which shall inform the sender of the same.

This latter shall have the option of requiring by paid service advice, telegraphic or postal, addressed to the coast station, that his radiotelegram be kept for a fresh period of nine days, for transmission to the ship, and so on. In the absence of such request the radiotelegram shall be returned as undelivered at the end of the ninth day (the day of handing in not to be included).

However, if the coast station is sure that the ship has left its radius of action before the station could have transmitted the radiotelegram to it, such station shall immediately inform the office of origin, which shall without delay advise the sender of the cancellation of the message. Nevertheless, the sender may, by paid service advice, request the coast station to transmit the radiotelegram when the ship next passes.

VIII.—SPECIAL RADIOTELEGRAMS.

XXXVIII.

The following only shall be allowed :—

1st, *Reply Paid Radiotelegrams.*—These radiotelegrams shall bear, before the address, the indication, "Réponse payée," or "RP," completed by the mention of the amount paid in advance for the reply—for example : "Réponse payée fr. x," or "RP, fr. x."

The reply voucher issued on board a ship shall give the right to send, up to the limit of its value, a radiotelegram to any address whatever from the ship station which issues such voucher.

2nd, *Collated Radiotelegrams.*

3rd, *Express Delivery Radiotelegrams.*—But only in cases in which the amount of the cost of express delivery is collected from the addressee. The countries which cannot adopt these radiotelegrams must notify the fact to the International Bureau. Radiotelegrams for express delivery, with collection of the cost from the sender, may be allowed when they are intended for the

country in whose territory the corresponding coast station is situated.

4th, *Radiotelegrams for Delivery by Post.*

5th, *Multiple Radiotelegrams.*

6th, *Radiotelegrams with Acknowledgment of Receipt.*—But only with regard to notification of the date and time at which the coast station has transmitted to the ship station the telegram addressed to the latter.

7th, *Paid Service Advices.*—Except those asking for repetition of information. Nevertheless, all paid service advices shall be allowed on the route over the telegraph lines.

8th, *Urgent Radiotelegrams.*—But only in transmission over the telegraph lines, and subject to the application of the International Telegraph Regulations.

XXXIX.

Radiotelegrams may be transmitted by a coast station to a ship, or by a ship to another ship, with the object of being forwarded by post, the posting to take place from a port of call of the receiving ship.

The address of these radiotelegrams must be drawn up as follows :—

1st, Paid instruction "poste," followed by the name of the port where the radiotelegram is to be posted;

2nd, Full name and address of the addressee;

3rd, Name of the ship station which is to carry out the posting;

4th, When necessary, name of the coast station.

Example: Poste Buenos Aires, Martinez, 14 Calle Prat, Valparaiso, Avon Lizard.

The charge shall include, as well as the radiotelegraph and telegraph charges, a sum of 25 centimes for the postage of the radiotelegram.

IX.—ARCHIVES.

XL.

The originals of radiotelegrams, as well as the documents relating thereto, retained by the Administrations, shall be kept with all necessary precautions in respect of secrecy for at least fifteen months, counting from the month following that in which the radiotelegrams were handed in.

These originals and documents shall be sent, as far as

possible, at least once a month by the ship stations to the Administrations to which they are subject.

X.—REFUNDS AND REIMBURSEMENTS.

XLI.

With regard to refunds and reimbursements, the provisions of the International Telegraph Regulations shall apply, bearing in mind the restrictions laid down in Clauses XXXVIII. and XXXIX. of the present Regulations and subject to the following reservations:—

The time occupied in radiotelegraphic transmission, and also the time during which the radiotelegram remains at the coast station in the case of radiotelegrams addressed to ships, or in the ship station in the case of radiotelegrams originating in ships, shall not be counted in the period of delay giving rise to refunds and reimbursements.

If the coast station informs the office of origin that a radiotelegram cannot be transmitted to the ship to which it is addressed, the Administration of the country of origin shall immediately initiate the reimbursement to the sender of the coast and ship charges in respect of such radiotelegram. In this case, the charges reimbursed shall not appear in the account for which provision is made by Regulation XLII., but the radiotelegram shall be mentioned therein as a memorandum.

Reimbursements shall be borne by the various Administrations and private enterprises which have taken part in the forwarding of the radiotelegram, each one of them relinquishing its share of the charge. Nevertheless, radiotelegrams falling under the provision of Articles VII. and VIII. of the Convention of St. Petersburg shall remain subject to the provisions of the International Telegraph Regulations, except when it is due to an error of service that such radiotelegrams have been accepted.

When the acknowledgment of receipt of a radiotelegram has not reached the station which transmitted the message, the charge shall not be refunded until it has been proved that the radiotelegram is one which gives occasion for reimbursement.

XI.—ACCOUNTING.

XLII.

1. Coast and ship charges shall not be entered in the accounts provided for by the International Telegraph Regulations.

The accounts relating to these charges shall be settled by the Administrations of the countries concerned. They shall be

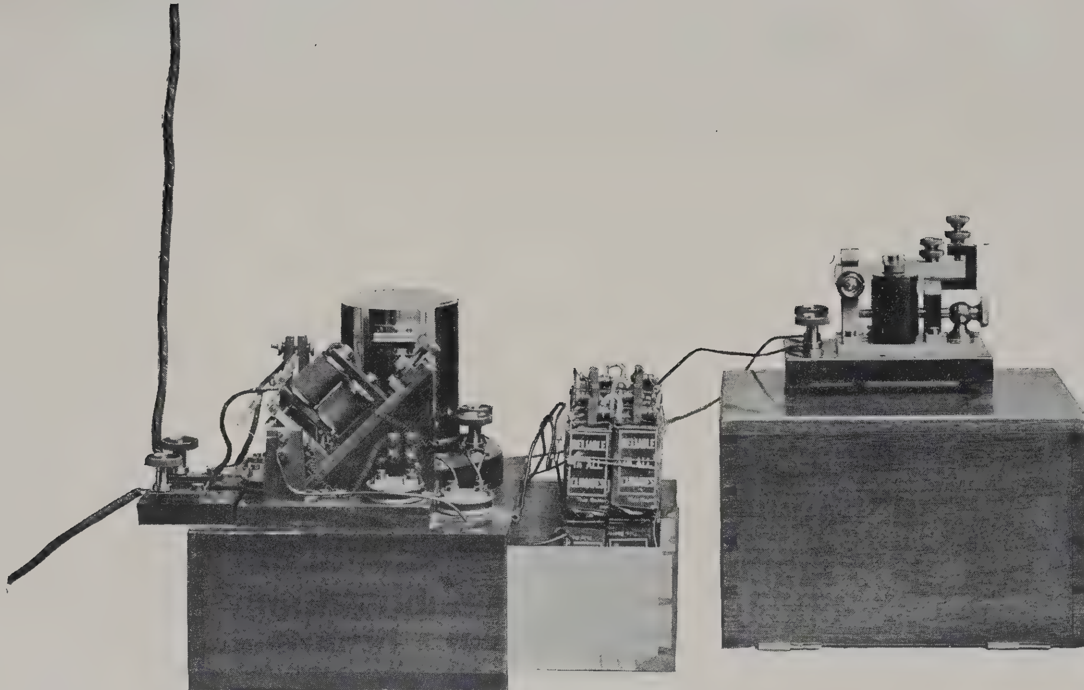
prepared by the Administrations to which the coast stations belong, and communicated by them to the Administrations concerned. In cases in which the working of the coast stations is independent of the Administration of the country, the person working these stations may be substituted in respect of accounts for the Administration of such country.

2. As to transmission over the lines of the telegraph system the radiotelegram shall be treated in respect of accounts in conformity with the Telegraph Regulations.

3. In the case of radiotelegrams originating from ships the Administration to which the coast station is subject shall debit the Administration to which the ship station of origin is subject with the coast and ordinary telegraph charges, the total charges collected for prepaid replies, the coast and telegraph charges collected for collations, the charges appertaining to express delivery (in the case provided for in Regulation XXXVIII.) or delivery by post, and with those collected for supplementary copies (TM). The Administration to which the coast station is subject shall credit, when the case arises, through the channel of the telegraph accounts and through the medium of the offices which have taken part in the transmission of the radiotelegrams, the Administration to which the office of destination is subject with the total charges relating to prepaid replies. With regard to telegraph charges and charges relating to express delivery or delivery by post, and to supplementary copies, the procedure shall be in conformity with the telegraph regulations, the coast station being regarded as the telegraph office of origin.

In the case of radiotelegrams intended for a country lying beyond that to which the coast station belongs, the telegraph charges to be liquidated conformably to the above provisions are those which arise either from tables "A" and "B" appended to the International Telegraph Regulations or from special arrangements concluded between the Administrations of adjoining countries, and published by those Administrations, and not the charges which might be made under the special provisions of Regulations XXIII. (paragraph 1) and XXVII. (paragraph 1) of the Telegraph Regulations.

In the case of radiotelegrams and paid-service advices addressed to ships, the Administration to which the office of origin is subject shall be debited directly by that to which the coast station is subject with the coast and ship charges. Nevertheless,



EARLY TYPE OF COHERER RECEIVER

[To face page 64.

the total charges appertaining to prepaid replies shall be credited, if there is occasion, from country to country through the channel of the telegraph accounts, until they reach the Administration to which the coast station is subject. In respect of the telegraph charges and charges relating to delivery by post and for supplementary copies, the procedure shall be in conformity with the telegraph regulations. The Administration to which the coast station is subject shall credit that to which the ship of destination is subject with the ship charge, if there is occasion, with the charges belonging to the intermediate ship stations, with the total charge collected for prepaid replies, with the ship charge relating to collation, and also with the charges made for preparing supplementary copies and for delivery by post.

The paid service advices, and the prepaid replies themselves, shall be treated, in the radiotelegraph accounts, in all respects like other radiotelegrams.

In the case of radiotelegrams forwarded by means of one or two intermediate ship stations, each of the latter shall debit the ship station of origin, if the radiotelegram is one coming from a ship, or the ship station of destination if the radiotelegram is one intended for a ship, with the ship charge due to it for transit.

4. In principle the settlement of account appertaining to exchanges between ship stations shall be made directly as between the companies working those stations, the station of origin being debited by the station of destination.

5. The monthly accounts serving as a basis for the special accounting in respect of radiotelegrams shall be drawn up radiotelegram by radiotelegram, with all necessary particulars, and within a period of six months counting from the month to which they belong.

6. The Governments reserve to themselves the option of making between themselves and with private companies (contractors working radiotelegraphic stations, shipping companies, etc.) special arrangements with a view to the adoption of other provisions respecting accounts.

XII.—INTERNATIONAL BUREAU.

XLIII.

The supplementary expenses resulting from the work of the International Bureau in connection with radiotelegraphy must not exceed 80,000 fcs. per annum, not including special expenses to which the meeting of an International Conference gives rise.

The Administrations of the contracting States shall be, for purposes of contribution towards the expenses, divided into six classes as follows :—

1st Class.—Union of South Africa, Germany, United States of America, Alaska, Hawaii, and the other American possessions in Polynesia, the Philippine Islands, Porto Rico and the American possessions in the Antilles, the zone of the Panama Canal, the Argentine Republic, Australia, Austria, Brazil, Canada, France, Great Britain, Hungary, British India, Italy, Japan, New Zealand, Russia, Turkey.

2nd Class.—Spain.

3rd Class.—Russian Central Asia (littoral of the Caspian Sea), Belgium, Chili, Chosen, Formosa, Japanese Sakhalin and the leased territory of Kwantung, Dutch Indies, Norway, Holland, Portugal, Roumania, Western Siberia (littoral of the Arctic Ocean), Eastern Siberia (littoral of the Pacific Ocean), Sweden.

4th Class.—German East Africa, German South-West Africa, The Cameroons, Togoland, German Pacific Protectorates, Denmark, Egypt, Indo-China, Mexico, Siam, Uruguay.

5th Class.—French West Africa, Bosnia-Herzegovina, Bulgaria, Greece, Madagascar, Tunis.

6th Class.—French Equatorial Africa, Portuguese West Africa, Portuguese East Africa and the Portuguese possessions in Asia, Bokhara, the Belgian Congo, the Colony of Curaçao, the Spanish Colony of the Gulf of Guinea, Erythrea, Khiva, Morocco, Monaco, Persia, San Marino, Italian Somaliland.

XLIV.

The various Administrations shall forward to the International Bureau a form modelled on that hereto appended (see pp. 72 and 73) and containing the particulars enumerated in the form with regard to the stations covered by Clause V. of the Regulations. Any modifications which may take place and additions shall be communicated by the Administrations to the International Bureau from the 1st to the 10th of each month. With the help of these communications the International Bureau will draw up the Nomenclature provided for by Regulation V. The Nomenclature shall be distributed to the Administrations concerned. It may also, with the supplements relating thereto, be sold to the public at cost price.

The International Bureau shall take care that the adoption of identical call signals for radiotelegraph stations be avoided.

XIII. — METEOROLOGICAL TRANSMISSIONS, TIME SIGNALS, AND OTHER TRANSMISSIONS.

XLV.

1. The Administrations shall take the necessary steps to supply their coast stations with meteorological telegrams containing the particulars of interest to the district of such stations. These telegrams, the text of which must not exceed twenty words, shall be sent to the ships which ask for them. The charge for these meteorological telegrams shall be carried to the account of the ships to which they are addressed.

2. The meteorological observations, made by certain ships appointed for that purpose by the country to which they belong, may be sent once a day as paid service advices to the coast stations authorised to receive them by the Administrations concerned, who shall also appoint the meteorological offices to which these observations shall be addressed by the coast station.

3. Time signals and meteorological telegrams shall be transmitted in succession one to another in such a way that the total duration of their transmission does not exceed ten minutes. In principle, while they are being sent, all radiotelegraph stations, transmission by which might disturb the reception of these signals and telegrams, shall keep silent so as to allow all stations which desire to do so to receive these telegrams and signals. Exception shall be made in the case of distress calls and State telegrams.

4. The Administrations shall facilitate the communication to the marine information agencies which they may appoint of the information respecting wrecks and casualties at sea, or presenting a general interest for navigation, which the coast stations can communicate regularly.

XIV.—MISCELLANEOUS PROVISIONS.

XLVI.

Transmission exchanged between ship stations must be carried out in such a way as not to interfere with the service of coast stations, as the latter must have, as a general rule, right of priority for public correspondence.

XLVII.

Coast stations and ship stations shall be bound to take part in the retransmission of radiotelegrams in cases in which com-

munication cannot be established directly between the stations of origin and destination.

Nevertheless, the number of transmissions shall be limited to two.

In the case of radiotelegrams intended for *terra firma* use may only be made of retransmissions to reach the nearest coast station.

Retransmission shall be in all cases subject to the condition that the intermediate station which receives the radiotelegram in transit is in a position to send it on.

XLVIII.

If the transmission of a radiotelegram is carried out partly on the telegraph lines or through radiotelegraph stations belonging to a non-contracting Government, such radiotelegram may be sent forward, subject to the reservation that at least the Administrations to which these lines or stations belong shall have declared that they are willing to apply, when the case arises, the provisions of the Convention and of the Regulations, which are indispensable, in order that radiotelegrams may be regularly forwarded, and that accounting may be assured.

Such declaration shall be made to the International Bureau, and brought to the knowledge of the offices of the Telegraph Union.

XLIX.

The modifications of the present Regulations which may be rendered necessary in consequence of the decisions of future Telegraph Conferences shall come into force on the date fixed for the application of the provisions decided upon by each one of these later Conferences.

L.

The provisions of the International Telegraph Regulations shall apply by analogy to radiotelegraph correspondence in so far as they are not contrary to the provisions of the present Regulations.

The following in particular apply to radiotelegraph correspondence :—

The provisions of Article XXVII., paragraphs 3 to 6, of the Telegraph Regulations referring to the collection of charges; those of Articles XXXVI. and XLI. referring to the indication of the route to be taken; those of Articles LXXV., paragraph 1, LXXVIII., paragraphs 2 to 4, and LXXIX., para-

graphs 2 to 4, relating to preparing of accounts. Nevertheless, first, the period of six months provided by paragraph 2 of Article LXXIX. of the Telegraph Regulations for the verification of accounts is extended to nine months in the case of radiotelegrams; second, the provisions of Article XVI., paragraph 2, are not considered as authorising the free transmission by radiotelegraph stations of service telegrams relating exclusively to the telegraph service, nor the free transmission over the lines of the telegraph system of service telegrams relating exclusively to the radiotelegraph service; third, the provisions of Article LXXIX., paragraphs 3 and 5, do not apply to radiotelegraph accounting. For the purposes of applying the provisions of the Telegraph Regulations coast stations shall be regarded as offices of transit, except when the Radiotelegraphic Regulations stipulate expressly that these stations are to be considered as offices of origin or destination.

Conformable to Article II. of the Convention of London the present regulations will come into force on the 1st of July, 1913.

In witness whereof the respective Plenipotentiaries have signed these Regulations on a single copy, which will remain deposited in the archives of the British Government, and of which a copy will be sent to each party.

APPENDIX

I.

Table referred to in Regulation XLIV. (p. 69).

(*a*) Coast Stations

Name.	Nationality.	Geographical Position. E=East longitude; O=West longitude; N=North latitude; S=South latitude. Territorial subdivisions.	Call Signal.	Normal Range in Nautical Miles.	Radiotelegraph System, with the characteristics of the System of emission.	Wave-lengths in metres (the normal wave-length is underlined).

Nature of Services effected.	Working hours (Time according to the Meridian).	Coast Charge.		*Observations* (if occasion, Time and Method of sending Time-Signals and Meteorological Telegrams).
		Per Word in Francs.	Minimum per Radiotelegram in Francs.	

(*b*) Ship Stations.

Name.	Nationality.	Call Signal.	Normal Range in Nautical Miles.	Radiotelegraph System, with the characteristics of the System of emission.	Wave-lengths in Metres.

Nature of Services effected.	Working Hours.	Ship Charge.		*Observations* (if occasion, Name and Address of the person working the Station).
		Per Word in Francs.	Minimum per Radiotelegram in Francs.	

1° Warships.

2° Merchant Ships.

II.

LIST OF ABBREVIATIONS TO BE USED IN RADIOTELEGRAPH TRANSMISSIONS (referred to in Article XXII, p. 58).

Abbreviation. 1.	Question. 2.	Answer or Advice. 3.
—.—. ——.— (CQ)	.. .. ..	Inquiry signal employed by a station which desires to correspond.
—.—. (TR)	.. ..	Signal announcing the sending of indications concerning a ship station (article XXVIII).
——..—— !)	.. ..	Signal indicating that a station is about to send with high power.
PRB	Do you wish to communicate with my station by means of the International Signal Code ?	I wish to communicate with your station by means of International Signal Code.
QRA	What is the name of your station ?	This station is ....
QRB	How far are you from my station ?	The distance between our stations is .... nautical miles.
QRC	What are your true bearings ? ..	My true bearings are .... degrees.
QRD	Where are you bound ?	I am bound for ....
QRF	Where are you coming from ? ..	I am coming from ....
QRG	To what company or line of navigation do you belong ?	I belong to ...
QRH	What is your wave-length ? ..	My wave-length is .... metres.
QRJ	How many words have you to transmit ?	I have .... words to transmit.
QRK	How are you receiving ?	I am receiving well.
QRL	Are you receiving badly ? Shall I transmit 20 times ...— so that you can adjust your apparatus ?	I am receiving badly. Transmit 20 times ...—. so that I can adjust my apparatus.
QRM	Are you disturbed ?	I am disturbed.
QRN	Are the atmospherics very strong ?	The atmospherics are very strong.
QRO	Shall I increase my power ? ..	Increase your power.
QRP	Shall I decrease my power ? ..	Decrease your power.
QRQ	Shall I transmit faster ?	Transmit faster.
QRS	Shall I transmit more slowly ? ..	Transmit more slowly.
QRT	Shall I stop transmitting ?	Stop transmitting.
QRU	Have you anything for me ? ..	I have nothing for you.
QRV	Are you ready ?	I am ready. All is in order.
QRW	Are you busy ?	I am busy with another station (or with .... please do not interrupt)

QRX	Shall I wait ?	Wait. I will call you at .... o'clock (or when I want you).
QRY	What is my turn ?	Your turn is No. ....
QRZ	Are my signals weak ?	Your signals are weak.
QSA	Are my signals strong ?	Your signals are strong.
QSB	Is my tone bad ?	The tone is bad.
	Is my spark bad ?	The spark is bad.
QSC	Is the spacing bad ?	The spacing is bad.
QSD	Let us compare watches. My time is .... What is your time ?	The time is ....
QSF	Are the radiotelegrams to be transmitted alternately or in series ?	Transmission will be in alternate order.
QSG	—	Transmission will be in series of five radiotelegrams.
QSH	—	Transmission will be in series of ten radiotelegrams.
QSJ	What is the charge to collect for .... ?	The charge to collect is ....
QSK	Is the last radiotelegram cancelled ?	The last radiotelegram is cancelled.
QSL	Have you got the receipt ?	Please give a receipt.
QSM	What is your true course ?	My true course is .... degrees.
QSN	Are you communicating with land ?	I am not communicating with land.
QSO	Are you in communication with another station (or with ....) ?	I am in communication with .... (through the medium of ....).
QSP	Shall I signal to .... that you are calling him ?	Inform .... that I am calling him.
QSQ	Am I being called by .... ? ..	You are being called by ....
QSR	Will you dispatch the radiotelegram ?	I will forward the radiotelegram.
QST	Have you received a general call ? ..	General call to all stations.
QSU	Please call me when you have finished (or at .... o'clock)	I will call you when I have finished.
QSV	Is public correspondence engaged ?	Public correspondence is engaged. Please do not interrupt.
QSW	Must I increase the frequency of my spark ?	Increase the frequency of your spark.
QSY	Shall I transmit with a wave-length of .... metres ?	Let us transfer to the wave-length of .... metres.
QSX	Must I diminish the frequency of my spark ?	Diminish the frequency of your spark.

When an abbreviation is followed by a mark of interrogation it applies to the question indicated in respect of that abbreviation.

EXAMPLES.

Station.		
A	QRA ?	What is the name of your station ?
B	QRA Campania	This is the Campania.
A	QRG ?	To what company or line of navigation do you belong ?
B	QRG Cunard. QRZ	I belong to the Cunard Line. Your signals are weak.

Station A then increases the power of its transmitter and sends :

A	QRK ?	How are you receiving ?
B	QRK	I am receiving well.
	QRB 80	The distance between our stations is 80 nautical miles.
	QRC 62	My true bearings are 62 degrees, etc.

INTERNATIONAL CONVENTION

ON

SAFETY OF LIFE AT SEA

London, January 20, 1914.

THE London International Conference on the Safety of Life at Sea, by which the Convention signed on January 20th, 1914, has been drawn up, met for the first time on November 12th, 1913, at the Foreign Office, London. The suggestion that such a Conference should be held emanated from the German Emperor, and the task of convening it was undertaken by the British Government. The following States were represented:—Great Britain, Germany, the United States, Australia, Austria-Hungary, Belgium, Canada, Denmark, Spain, France, Italy, Japan, Norway, the Netherlands, Russia, Sweden, and New Zealand. The delegations from the different States were composed, not of the representatives of the shipping trade, but of administrators, experts and jurists.

Lord Mersey was appointed Chairman of the Conference. To deal with the specific subjects submitted to it the Conference appointed five sub-committees, together with a sixth sub-committee for drafting the Convention, which was to embody the recommendations of the Committees as approved by the whole Conference.

The Convention contains 74 Articles, of which we present below the articles governing the use of wireless telegraphy:—

CHAPTER I.—SAFETY OF LIFE AT SEA.

Article 1.—The High Contracting Parties undertake to give effect to the provisions of this Convention, for the purpose of securing safety of life at sea, to promulgate all regulations and to take all steps which may be necessary to give the Convention full and complete effect.

The provisions of this Convention are completed by Regulations which have the same force and take effect at the same time as the Convention. Every reference to the Convention implies at the same time a reference to the Regulations annexed thereto.

CHAPTER II.—SHIPS TO WHICH THIS CONVENTION APPLIES.

Article 2.—Except where otherwise provided by this Convention, the merchant ships of any of the States of the High Contracting Parties, which are mechanically propelled, which carry more than 12 passengers, and which proceed from a port of one of the said States to a port situated outside that State, or conversely, are subject to the provisions of this Convention. Ports situated in the Colonies, Possessions, or Protectorates of the High Contracting Parties are considered to be ports outside the States of the High Contracting Parties.

Persons who are on board by reason of *force majeure* or in consequence of the obligation laid upon the master to carry shipwrecked or other persons, are not deemed to be passengers.

Article 3.—There are excepted from this Convention, save in the cases where the Convention otherwise provides, ships making voyages specified in a schedule to be communicated by each High Contracting Party to the British Government at the time of ratifying the Convention.

No schedule may include voyages in the course of which the ships go more than 200 sea miles from the nearest coast.

Each High Contracting Party has the right subsequently to modify its schedule of voyages in conformity with this Article on condition that it notifies the British Government of such modification.

Each High Contracting Party has the right to claim from another Contracting Party the benefit of the privileges of the Convention for all of its ships which are engaged in any one of the voyages mentioned in its own schedule. For this purpose the Party claiming such benefit shall impose on the said ships the obligations prescribed by the Convention in so far as, having regard to the nature of the voyage, these obligations would not be unnecessary or unreasonable.

Article 4.—No ship, not subject to the provisions of the Convention at the time of its departure, can be subjected to the Convention in the course of its voyage, if stress of weather or any other cause of *force majeure* compels it to take refuge in a port of one of the States of the High Contracting Parties.

CHAPTER III.—SAFETY OF NAVIGATION.

Article 5.—When the expression " every ship " is used in this chapter and in the corresponding part of the annexed Regulations, it includes all merchant ships, whether they are the ships

defined in Article 2 or not, which belong to any of the Contracting States.

Article 6.—The High Contracting Parties undertake to take all steps to ensure the destruction of derelicts in the northern part of the Atlantic Ocean east of a line drawn from Cape Sable to a point situated in latitude 34° north and longitude 70° west. Further, they will establish in the North Atlantic with the least possible delay a service for the study and observation of ice conditions and a service of ice patrol. For this purpose:—

Two vessels shall be charged with these three services.

During the whole of the ice season they shall be employed in ice patrol.

During the rest of the year the two vessels shall be employed in the study and observation of ice conditions and in the destruction of derelicts; nevertheless the study and observation of ice conditions shall be effectively maintained, in particular from the beginning of February to the opening of the ice season.

While the two vessels are employed in ice patrol the High Contracting Parties, to the extent of their ability and so far as the exigencies of the Naval Service will permit, will send warships or other vessels to destroy any dangerous derelicts, if this destruction is considered necessary at that time.

Article 7.—The Government of the United States is invited to undertake the management of the three services of derelict destruction, study and observation of ice conditions, and ice patrol. The High Contracting Parties which are specially interested in these services, and whose names are given below, undertake to contribute to the expense of establishing and working the said services in the following proportions:—

	Per cent.
Austria-Hungary	2
Belgium	4
Canada	2
Denmark	2
France	15
Germany	15
Great Britain	30
Italy	4
Netherlands	4
Norway	3
Russia	2
Sweden	2
United States of America	15

Each of the High Contracting Parties has the right to discontinue its contribution to the expense of working these services after September 1st, 1916. Nevertheless, the High Contracting Party which avails itself of this right will continue responsible for the expenses of working up to the 1st September following the date of denunciation of the Convention on this particular point. To take advantage of the said right, it must give notice to the other Contracting Parties at least six months before the said 1st September; so that, to be free from its obligations on September 1st, 1916, it must give notice on March 1st, 1916, at the latest, and similarly for each subsequent year.

In case the United States Government should not accept the proposal made to them, or in case one of the High Contracting Parties, for any reason, should not assume responsibility for the pecuniary contribution defined above, the High Contracting Parties shall settle the question in accordance with their mutual interests.

The Government of the High Contracting Party which undertakes the management of the service of derelict destruction is invited to devise means of granting, at the expense of this service, to merchant ships, which have contributed in an effective manner to the destruction of ocean derelicts, rewards to be fixed by the Government in accordance with the services rendered.

The High Contracting Parties which contribute to the cost of the three above-mentioned services shall have the right by common consent to make from time to time such alterations in the provisions of this Article and of Article 6 as appear desirable.

Article 8.—The master of every ship which meets with dangerous ice or a dangerous derelict is bound to communicate the information by all the means of communication at his disposal to the ships in the vicinity, and also to the competent authorities at the first point of the coast with which he can communicate.

Every Administration which receives intelligence of dangerous ice or a dangerous derelict shall take all steps which it thinks necessary for bringing the information to the knowledge of those concerned and for communicating it to the other Administrations.

The transmission of messages respecting ice and derelicts is free of cost to the ships concerned.

It is desirable that the said information should be sent in a uniform manner. For this purpose a code, the use of which is optional, appears in Article I. of the Regulations annexed hereto.

Article 9.—The master of every ship fitted with a radio-telegraph installation, on becoming aware of the existence of an imminent and serious danger to navigation, shall report it immediately in the manner prescribed by Article II. of the Regulations annexed hereto.

Article 10.—When ice is reported on, or near, his course, the master of every ship is bound to proceed at night at a moderate speed, or to alter his course so as to go well clear of the danger zone.

Article 11.—The ships defined by Article 2 shall have on board a Morse signalling lamp of sufficient range.

The use of Morse signals is regulated by the Code appearing in Article III., as well as by Article IV. of the Regulations annexed hereto.

Article 12.—The use of the international distress signals for any other purpose than that of signals of distress is prohibited on every ship.

The use of private signals which are liable to be confused with the international distress signals is prohibited on every ship.

Article 13.—The selection of the routes across the North Atlantic in both directions is left to the responsibility of the steamship companies. Nevertheless the High Contracting Parties undertake to impose on these companies the obligation to give public notice of the regular routes which they propose their vessels should follow, and of any changes which they make in them.

The High Contracting Parties undertake, further, to use their influence to induce the owners of all vessels crossing the Atlantic to follow as far as possible the routes adopted by the principal companies.

Article 14.—The High Contracting Parties undertake to use all diligence to obtain from the Governments which are not parties to this Convention their agreement to the revision of the International Regulations for Preventing Collisions at Sea as indicated below:—

(*A*) The Regulations shall be completed or revised in regard to the following points:—

(1) The second white light.
(2) The stern light.
(3) A day signal for motor vessels.
(4) A sound signal for a vessel towed.
(5) The prohibition of signals similar to distress signals.

(*B*) Articles 2, 10, 14, 15, 31 of the said Regulations shall be amended in accordance with the following provisions:—

Article 2. The second white mast-head light to be compulsory.

Article 10. A permanent fixed stern light to be compulsory.

Article 14. A special day signal to be compulsory for motor vessels.

Article 15. A special sound signal to be established for use by a vessel in tow, or if the tow is composed of several vessels, by the last vessel of the tow.

Article 31. Article 31 to be modified in the following manner:—Add to the lists of both day and night signals the international radiotelegraph distress signal.

Article 15.—The Governments of the High Contracting Parties undertake to maintain, or, if it is necessary, to adopt, measures for the purpose of ensuring that from the point of view of safety of life at sea, the ships defined in Article 2 shall be sufficiently and efficiently manned.

Chapter IV., which contains Articles 16 to 30, refers to construction.

Chapter V.—Radiotelegraphy.

Article 31.—All merchant ships belonging to any of the Contracting States, whether they are propelled by machinery or by sails, and whether they carry passengers or not, shall, when engaged on the voyages specified in Article 2, be fitted with a radiotelegraph installation if they have on board fifty or more persons in all.

Advantage may not be taken of the provisions of Articles 2 and 3 of this Convention to exempt a ship from the requirements of this chapter.

Article 32.—Ships on which the number of persons on board is exceptionally and temporarily increased up to or beyond fifty as the result of *force majeure*, or because the master is under the necessity of increasing the number of his crew to fill the places of those who are ill, or is obliged to carry shipwrecked or other persons, are exempted from the above obligation.

Moreover, the Governments of each of the Contracting States, if they consider that the route and the conditions of the voyage are such as to render a radiotelegraph installation

unreasonable or unnecessary, may exempt from the above requirement the following ships :—

(1) Ships which in the course of their voyage do not go more than 150 sea miles from the nearest coast.

(2) Ships on which the number of persons on board is exceptionally or temporarily increased up to or beyond fifty by the carriage of cargo hands for a part of the voyage, provided that the said ships are not going from one continent to another, and that, during that part of their voyage, they remain within the limits of latitude 30° N. and 30°. S.

(3) Sailing vessels of primitive build, such as *dhows, junks*, etc., if it is practically impossible to instal a radiotelegraph apparatus.

Article 33.—Ships which, in accordance with Article 31 above, are required to be fitted with a radiotelegraph installation are divided, for the purpose of radiotelegraph service, into three classes, in accordance with the classification established for ship stations in Article XIII. (*b*) of the Regulations annexed to the Radiotelegraph Convention, signed in London on July 5th, 1912, viz. :—

First Class.—Ships having a continuous service.

There shall be placed in the First Class ships which are intended to carry twenty-five or more passengers :—

(1) if they have an average speed in service of fifteen knots or more;

(2) if they have an average speed in service of more than thirteen knots, but only subject to the two-fold condition that they have on board two hundred persons or more (passengers and crew), and that, in the course of their voyage, they go a distance of more than five hundred sea miles between any two consecutive ports. Nevertheless these ships may be placed in the Second Class on condition that they have a continuous watch.

Second Class.—Ships having a service of limited duration.

There shall be placed in the Second Class all ships which are intended to carry twenty-five or more passengers, if they are not, for other reasons, placed in the First Class.

Ships placed in the Second Class must, during navigation, maintain a continuous watch for at least seven hours a day, and a watch of ten minutes at the beginning of every other hour.

Third Class.—Ships which have no fixed periods of service.

All ships which are placed neither in the First nor in the Second Class shall be placed in the Third Class.

The owner of a ship placed in the Second or in the Third Class has the right to require that, if the ship complies with all the requirements for a superior class, a statement to the effect that it belongs to that superior class shall be inserted in the Safety Certificate.

Article 34.—Ships which are required by Article 31 above to be fitted with a radiotelegraph installation shall be required, by the Governments of the countries to which they belong, to maintain a continuous watch during navigation as soon as the said Governments consider that it will be of service for the purpose of safety of life at sea.

Meanwhile, the High Contracting Parties undertake to require, from the date of the ratification of the present Convention, subject to the delays specified below, a continuous watch on the following ships:—

(1) Ships whose average speed in service exceeds 13 knots, which have on board 200 persons or more, and which, in the course of their voyage, go a distance of more than 500 sea miles between two consecutive ports, when these ships are placed in the Second Class.

(2) Ships in the Second Class, for the whole of the time during which they are more than 500 sea miles from the nearest coast.

(3) Other ships specified in Article 31, when they are engaged in the Trans-Atlantic trade, or when they are engaged in other trades if their route takes them more than 1,000 sea miles from the nearest coast.

Ships connected with all kinds of fishing business, including whaling, which are required to be fitted with a radiotelegraph installation, shall not be required to maintain a continuous watch.

The continuous watch may be kept by one or more operators, holding certificates in accordance with Article X. of the Regulations annexed to the International Radiotelegraph Convention, 1912, together, if necessary, with one or more certificated watchers. Nevertheless, if an efficient automatic calling apparatus is invented, the continuous watch may be maintained by this

means by agreement between the Governments of the High Contracting Parties.

By "certificated watcher" is meant any person holding a certificate issued under the authority of the Administration concerned. To obtain this certificate, the applicant must prove that he is capable of receiving and understanding the radiotelegraph distress signal and the safety signal described in the Regulations annexed hereto.

The High Contracting Parties undertake to take steps to ensure that the certificated watchers observe the secrecy of correspondence.

Article 35.—The radiotelegraph installations required by Article 31 above shall be capable of transmitting clearly perceptible signals from ship to ship over a range of at least 100 sea miles by day under normal conditions and circumstances.

Every ship which is required, in conformity with the provisions of Article 31 above, to be fitted with a radiotelegraph installation, shall, whatever be the class in which it is placed, be provided in accordance with Article XI. of the Regulations annexed to the International Radiotelegraph Convention, 1912, with an emergency installation, every part of which is placed in a position of the greatest possible safety to be determined by the Government of the country to which the ship belongs.

In all cases the emergency installation must be placed, in its entirety, in the upper part of the ship, as high as practically possible.

The emergency installation includes, as provided by Article XI. of the Regulations annexed to the International Radiotelegraph Convention, 1912, an independent source of energy capable of being put into operation rapidly and of working for at least six hours with a minimum range of eighty sea miles for ships in the First Class and fifty sea miles for ships in the two other classes.

If the normal installation, which, in accordance with this Article, has a range of at least one hundred sea miles, satisfies all the conditions prescribed above, an emergency installation is not required.

The licence provided for in Article IX. of the Regulations annexed to the International Radiotelegraph Convention, 1912, may not be issued unless the installation complies both with the provisions of that Convention and also with the provisions of this Convention.

Article 36.—The matters governed by the International Radiotelegraph Convention, 1912, and the Regulations annexed thereto, and in particular the radiotelegraph installations on ships, the transmission of messages, and the certificates of the operators, remain and will continue subject to the provisions:

(1) of that Convention and the Regulations annexed thereto, or of any other instruments which may in the future be substituted therefor;

(2) of this Convention, in regard to all the points in which it supplements the aforementioned documents.

Article 37.—Every master of a ship who receives a call for assistance from a vessel in distress is bound to proceed to the assistance of the persons in distress.

Every master of a vessel in distress has the right to requisition from among the ships which answer his call for assistance the ship or ships which he considers best able to render him assistance, but he must exercise this right only after consultation, so far as may be possible, with the masters of those ships. Such ships are then bound to comply immediately with the requisition by proceeding with all speed to the assistance of the persons in distress.

The masters of the ships which are required to render assistance are released from this obligation as soon as the master or masters requisitioned have made known that they will comply with the requisition, or as soon as the master of one of the ships which has reached the scene of the casualty has made known to them that their assistance is no longer necessary.

If the master of a ship is unable, or considers it unreasonable or unnecessary, in the special circumstances of the case, to go to the assistance of the vessel in distress, he must immediately inform the master of the vessel in distress accordingly. Moreover, he must enter in his log-book the reasons justifying his action.

The above provisions do not prejudice the International Convention for the unification of certain rules with respect to Assistance and Salvage at Sea, signed at Brussels on September 23rd, 1910, and, in particular, the obligation to render assistance laid down in Article II. of that Convention.

Article 38.—The High Contracting Parties undertake to take all steps necessary for giving effect to the provisions of this chapter with the least possible delay. Nevertheless, they may allow:

A delay not exceeding one year, from the date of the

ratification of this Convention, for the provision and training of operators and for the installation of the apparatus on ships placed in the First and Second Classes.

A delay not exceeding two years, from the date of the ratification of this Convention, for the provision and training of the operators and watchers on the ships in the Third Class, for the installation of the apparatus on ships in the Third Class and for the establishment of a continuous watch on ships placed in the Second and Third Classes.

CHAPTER VI.—Refers to Life-saving Appliances and Fire Protection.

REGULATIONS.

SAFETY OF NAVIGATION.

ARTICLE 1.

CODE FOR THE TRANSMISSION BY RADIOTELEGRAPHY OF INFORMATION RELATING TO ICE, DERELICTS, AND WEATHER.

INSTRUCTIONS.

Transmission of Information.—The transmission of information concerning ice and derelicts is obligatory. This information may be sent from ship to ship or to the Hydrographic Office, Washington, either in clear or by means of the abbreviations used in Part I. of this Code.

The transmission of information relating to weather is optional. Part II. of this Code may be used for this purpose, but may be modified at any time by the Meteorological Congress.

Information required:

PART I.—ICE AND DERELICTS.

1. The kind of ice or derelict observed.
2. The position of ice or derelict when last determined.

PART II.—METEOROLOGICAL INFORMATION.

1. The direction and force of the wind.
2. The set and velocity of the current.
3. Weather or state of the sky at a fixed hour.
4. Height of barometer and air temperature.
5. Barometric tendency and sea-surface temperature.

The time to be adopted:

In all radiotelegrams relating to ice or derelicts the time shall be given in Greenwich mean time.

The Address:

Reports, when sent to the Hydrographic Office, Washington, should be addressed "Hydrographic"; reports to the Meteorological Office, London, should be addressed "Meteorology."

The Message:

1. When sending information about ice or derelicts alone, two groups of five figures each are used, preceded by the word "ice"; these groups may be repeated as often as necessary.

2. If meteorological information is to be sent in addition, a further four groups of five figures each are used, preceded by the word "weather." These groups are inserted at the end of the message after all the information relating to ice has been given.

N.B.—If the message contains the word "weather," all the code groups before that word give information relating to ice, and those after the word "weather" give meteorological information. If there is no word "weather" in the message, it only contains information about ice. (See examples of the two kinds of message given in this Article.)

PART I.

Ice and Derelicts.

Information respecting ice and derelicts is given by means of ten figures divided into two groups of five figures each. These groups are preceded by the word "ice."

Two figures... The day of the month (*dd*), according to Code I.
One figure ... The time of observation (*T*), according to Code II.
One figure ... The kind of ice observed (*I*), according to Code III.
Three figures The latitude of the ice observed ($p\ p\ p$), to tenths of a degree (see table below).
Three figures The longitude of the ice observed ($p'\ p'\ p'$), to tenths of a degree (see table below).

The first group consists of $ddTIp$.
The second group consists of $ppp'p'p'$.

Codes.

Code I.—*Day of the Month.*

The day of the month is given by two figures, of which the first may be zero: 01 to 31.

Code II.—*Time of observation.*

The time of observation is included between—

	Code No.
1 a.m. and 4 a.m. ... Greenwich Mean Time ...	1
4 a.m. and 7 a.m.	2
7 a.m. and 10 a.m.	3
10 a.m. and 1 p.m.	4
1 p.m. and 4 p.m.	5
4 p.m. and 7 p.m.	6
7 p.m. and 10 p.m.	7
10 p.m. and 1 a.m.	8

Code III.—*Nature of Ice or Derelict observed.*

0. No ice observed.
1. Single iceberg. Huge mass of floating ice.
2. Several icebergs.
3. Numerous icebergs.
4. Floeberg. Thick piece of salt-water ice like a small iceberg.
5. Field ice. Ice extending as far as the eye can reach, but through which it is possible to navigate.
6. Pack ice. Pieces of ice broken from berg or floe, partly closed together.
7. Land ice. Ice attached to the shore since the winter.
8. Derelict.
9. (Not allotted.)

Example.

Message sent from Ship to Ship.

—	First Message.	Coded as	Second Message.	Coded as	Third Message.	Coded as	Fourth Message.	Coded as
Date of observation	15	15	15	15	15	15	16	16
Time of observation	10 a.m.–1 p.m.	4	4 p.m.–7 p.m.	6	7 p.m.–10 p.m.	7	4 p.m.–7 a.m.	2
Nature of ice or derelict	Field	5	Numerous icebergs	3	Derelict	8	Single iceberg	1
Position of ice or derelict	Latitude 45° 42′	457	Latitude 46° 5′	461	Latitude 46° 25′	464	Latitude 47° 19′	473
	Longitude 46° 11′	462	Longitude 44° 40′	447	Longitude 43° 58′	440	Longitude 40° 15′	402

The code of the above message would thus be:

S.S. to S.S.

Ice, 15454, 57462: 15634, 61447: 15784, 64440: 16214, 73402.

PART II.

Meteorological Information.

Information respecting weather, etc., is given by four groups of five figures each. These groups are preceded by the word "weather."

First Group (DDPPP):

The day of the month: two figures (*DD*), according to Code I.

The position of the ship when transmitting the message, indicated by three figures *(PPP)*, representing the 1° square in which the ship is situated, according to Code IV. and the numbered chart annexed to this Article.

Second Group (WWCCX):

Wind direction and force at 8 a.m. at the 75th meridian of west longitude: two figures *(WW)*, according to Code V.

Set and velocity of current: two figures *(CC)*, according to Code VI.

Weather or state of the sky at the same hour: one figure *(X)*, according to Code VII.

Third Group (BBBAA):

The barometric height to tenths of a millimetre at 8 a.m. at the 75th meridian of west longitude: three figures *(BBB)*, according to Code VIII.

Air temperature at the same hour: two figures *(AA)*, according to Code IX.

Fourth Group (bbSSS):

Barometric tendency at 8 a.m. at the 75th meridian of west longitude: two figures *(bb)*, according to Code X.

Sea surface temperature at the same hour: three figures *(SSS)*, according to Code XI.

Codes.

Code IV.—*Position of Ship.*

A chart gives the numbers to be assigned to each 1° square in the North Atlantic. The position of the ship, when the meteorological data given in Part II. were observed, is indicated by the three figures representing the 1° square in which the ship is situated. For example:—A position 51° 55′ N., 26° 49′ W. would be reported as 561.

Code V.

Wind Direction (to 16 points) and *Wind Force* at 8 a.m. mean time at the 75th meridian of west longitude *(IWW)*.

—	Wind Force, Beaufort Scale.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E	S.S.E.	S.	S.S.W.	S.W.	W.S.W.	W	W.N.W.	N.W.	N.N.W.	N.
Calm	0	00	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Light Breeze ...	1, 2, or 3	01	07	13	19	25	31	37	43	49	55	61	67	73	79	85	91
Moderate breeze	4 or 5	02	08	14	20	26	32	38	44	50	56	62	68	74	80	86	92
Strong wind ...	6 or 7	03	09	15	21	27	33	39	45	51	57	63	69	75	81	87	93
Gale Force ...	8 or 9	04	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
Storm Force ...	10 or 11	05	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
Hurricane ...	12	06	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96

N.B.—The wind direction is to be referred to true bearings

Code VI.

Direction (to 16 points) and *Velocity of the Current (CC)*.

Nautical Miles. per hour.	N.N.E.	N.E.	E.N.E.	E.	E.S.E.	S.E	S.S.E.	S.	S.S.W	S.W.	W.S.W.	W.	W.N.W.	N.W.	N.N.W.	N.
0·25	01	07	13	19	25	31	37	43	49	55	61	67	73	79	85	91
0·5	02	09	14	20	26	32	38	44	50	56	62	68	74	80	86	92
1	03	09	15	21	27	33	39	45	51	57	63	69	75	81	87	93
2	04	10	16	22	28	34	40	46	52	58	64	70	76	82	88	94
3	05	11	17	23	29	35	41	47	53	59	65	71	77	83	89	95
4	06	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96
	00	No current.														
	99	No observation.														

N.B.—The current is to be referred to true bearings.

Code VII.

The State of the Sky at 8 *a.m. mean time at the* 75*th meridian* of west longitude:

0. Sky quite clear.
1. Sky quarter clouded.
2. Sky half clouded.
3. Sky three-quarters clouded.
4. Sky entirely overcast.
5. Rain falling.
6. Snow or hail falling.
7. Haze or mist.
8. Fog.
9. Thunderstorm.

Code VIII.—*Height of Barometer.*

The reading of the mercury barometer is to be corrected for index error, and reduced to O° C. and sea level. A table of corrections is given below.

The corrected reading is coded by omitting the first figure of the barometer reading in tenths of a millimetre: for example, 761·2 mm. is coded as 612.

A table for converting hundredths of an inch to tenths of a millimetre is given below.

Code IX.

Air Temperature is coded in two figures according to the following table:—

Degrees Centigrade.	Degrees Fahrenheit.	Code No.	Degrees Centigrade.	Degrees Fahrenheit.	Code No.
—15·0	5·0	00	10·0	50·0	50
—14·5	5·9	01	10·5	50·9	51
—14·0	6·8	02	11·0	51·8	52
—13·5	7·7	03	11·5	52·7	53
—13·0	8·6	04	12·0	53·6	54
—12·5	9·5	05	12·5	54·5	55
—12·0	10·4	06	13·0	55·4	56
—11·5	11·3	07	13·5	56·3	57
—11·0	12·2	08	14·0	57·2	58
—10·5	13·1	09	14·5	58·1	59
—10·0	14·0	10	15·0	59·0	60
— 9·5	14·9	11	15·5	59·9	61
— 9·0	15·8	12	16·0	60·8	62
— 8·5	16·7	13	16·5	61·7	63
— 8·0	17·6	14	17·0	62·6	64
— 7·5	18·5	15	17·5	63·5	65
— 7·0	19·4	16	18·0	64·4	66
— 6·5	20·3	17	18·5	65·3	67
— 6·0	21·2	18	19·0	66·2	68
— 5·5	22·1	19	19·5	67·1	69
— 5·0	23·0	20	20·0	68·0	70
— 4·5	23·9	21	20·5	68·9	71
— 4·0	24·8	22	21·0	69·8	72
— 3·5	25·7	23	21·5	70·7	73
— 3·0	26·6	24	22·0	71·6	74
— 2·5	27·5	25	22·5	72·5	75
— 2·0	28·4	26	23·0	73·4	76
— 1·5	29·3	27	23·5	74·3	77
— 1·0	30·2	28	24·0	75·2	78
— 0·5	31·1	29	24·5	76·1	79
0·0	32·0	30	25·0	77·0	80
0·5	32·9	31	25·5	77·9	81
1·0	33·8	32	26·0	78·8	82
1·5	34·7	33	26·5	79·7	83
2·0	35·6	34	27·0	80·6	84
2·5	36·5	35	27·5	81·5	85
3·0	37·4	36	28·0	82·4	86
3·5	38·3	37	28·5	83·3	87
4·0	39·2	38	29·0	84·2	88
4·5	40·1	39	29·5	85·1	89
5·0	41·0	40	30·0	86·0	90
5·5	41·9	41	30·5	86·9	91
6·0	42·8	42	31·0	87·8	92
6·5	43·7	43	31·5	88·7	93
7·0	44·6	44	32·0	89·6	94
7·5	45·5	45	32·5	90·5	95
8·0	46·4	46	33·0	91·4	96
8·5	47·3	47	33·5	92·3	97
9·0	48·2	48	34·0	93·2	98
9·5	49·1	49	34·5	94·1	99

Code X.—*Barometric Tendency.*

By the "barometric tendency at a given hour" is meant the amount by which the barometric height has changed during the preceding three hours. It is to be expressed in millimetres. For example, the barometric tendency at 8 a.m. could be obtained by comparing the reading taken at that hour, say 755·7 mm., with a reading taken at 5 a.m., say 759·3 mm. In this case the barometric tendency would be expressed by a fall of 3·6 millimetres. As a general rule the barometric tendency is to be determined from the trace of the barograph.

The barometric tendency is coded in two figures, according to the following table:—

Rise in Barometer.		Code No.	Fall in Barometer.		Code No.
Millimetres	Inches.		Millimetres.	Inches.	
0·0— 0·4	0·00—0·01	01	0·0— 0·4	0·00—0·01	51
0·5— 0·9	0·02—0·03	02	0·5— 0·9	0·02—0·03	52
1·0— 1·4	0·04—0·05	03	1·0— 1·4	0·04—0·05	53
1·5— 1·9	0·06—0·07	04	1·5— 1·9	0·06—0·07	54
2·0— 2·4	0·08—0·09	05	2·0— 2·4	0·08—0·09	55
2·5— 2·9	0·10—0·11	06	2·5— 2·9	0·10—0·11	56
3·0— 3·4	0·12—0·13	07	3·0— 3·4	0·12—0·13	57
3·5— 3·9	0·14—0·15	08	3·5— 3·9	0·14—0·15	58
4·0— 4·4	0·16—0·17	09	4·0— 4·4	0·16—0·17	59
4·5— 4·9	0·18—0·19	10	4·5— 4·9	0·18—0·19	60
5·0— 5·4	0·20—0·21	11	5·0— 5·4	0·20—0·21	61
5·5— 5·9	0·22—0·23	12	5·5— 5·9	0·22—0·23	62
6·0— 6·4	0·24—0·25	13	6·0— 6·4	0·24—0·25	63
6·5— 6·9	0·26—0·27	14	6·5— 6·9	0·26—0·27	64
7·0— 7·4	0·28—0·29	15	7·0— 7·4	0·28—0·29	65
7·5— 7·9	0·30—0·31	16	7·5— 7·9	0·30—0·31	66
8·0— 8·4	0·32—0·33	17	8·0— 8·4	0·32—0·33	67
8·5— 8·9	0·34—0·35	18	8·5— 8·9	0·34—0·35	68
9·0— 9·4	0·36—0·37	19	9·0— 9·4	0·36—0·37	69
9·5— 9·9	0·38—0·38	20	9·5— 9·9	0·38—0·38	70
10·0—10·4	0·39—0·40	21	10·0—10·4	0·39—0·40	71
10·5—10·9	0·41—0·42	22	10·5—10·9	0·41—0·42	72
11·0—11·4	0·43—0·44	23	11·0—11·4	0·43—0·44	73
11·5—11·9	0·45—0·46	24	11·5—11·9	0·45—0·46	74
12·0—12·4	0·47—0·48	25	12·0—12·4	0·47—0·48	75
12·5—12·9	0·49—0·50	26	12·5—12·9	0·49—0·50	76
13·0—13·4	0·51—0·52	27	13·0—13·4	0·51—0·52	77
13·5—13·9	0·53—0·54	28	13·5—13·9	0·53—0·54	78
14·0—14·4	0·55—0·56	29	14·0—14·4	0·55—0·56	79
14·5—14·9	0·57—0·58	30	14·5—14·9	0·57—0·58	80
15·0—15·4	0·59—0·60	31	15·0—15·4	0·59—0·60	81
15·5—15·9	0·61—0·62	32	15·5—15·9	0·61—0·62	82

BAROMETRIC TENDENCY TABLE—*continued.*

Rise in Barometer.		Code No.	Fall in Barometer.		Code No.
Millimetres.	Inches.		Millimetres.	Inches.	
16·0—16·4	0·63—0·64	33	16·0—16·4	0·63—0·64	83
16·5—16·9	0·65—0·66	34	16·5—16·9	0·65—0·66	84
17·0—17·4	0·67—0·68	35	17·0—17·4	0·67—0·68	85
17·5—17·9	0·69—0·70	36	17·5—17·9	0·69—0·70	86
18·0—18·4	0·71—0·72	37	18·0—18·4	0·71—0·72	87
18·5—18·9	0·73—0·74	38	18·5—18·9	0·73—0·74	88
19·0—19·4	0·75—0·76	39	19·0—19·4	0·75—0·76	89
19·5—19·9	0·77—0·78	40	19·5—19·9	0·77—0·78	90
20·0—20·4	0·79—0·80	41	20·0—20·4	0·79—0·80	91
20·5—20·9	0·81—0·82	42	20·5—20·9	0·81—0·82	92
21·0—21·4	0·83—0·84	43	21·0—21·4	0·83—0·84	93
21·5—21·9	0·85—0·86	44	21·5—21·9	0·85—0·86	94
22·0—22·4	0·87—0·88	45	22·0—22·4	0·87—0·88	95
22·5—22·9	0·89—0·90	46	22·5—22·9	0·89—0·90	96
23·0—23·4	0·91—0·92	47	23·0—23·4	0·91—0·92	97
23·5—23·9	0·93—0·94	48	23·5—23·9	0·93—0·94	98
24·0—24·4	0·95—0·96	49	The barometric tendency cannot be reported.		99

Code XI.—*Sea Surface Temperature.*

Sea surface temperature to tenths of a degree Centigrade is coded by three figures, or, when necessary, by two figures preceded by zero. If the temperature is negative, the first of these three figures is 5.

For example :—

$-$ 2·2° C. is coded as 522.
$+$ 1·0° C. ,, 010.
$+$15·6° C. ,, 156.

Table of Corrections for reducing Barometric Heights to 0° C. and to Sea Level.

NOTE.—The barometric reading should first be corrected for index error. This error may be neglected if it is less than 0·3 mm.

The + sign indicates that the correction is to be *added* to the barometric reading.

The – sign indicates that the correction is to be *subtracted.*

Sea Surface Temperature.

Temperature by the thermometer attached to the barometer.			−4° C. 24·8° F.	−2° C. 28·4° F.	0° C. 32° F.	+2° C. 35·6° F.	4° C. 39·2° F.	6° C. 42·8° F.	8° C. 46·4° F.	10° C 50° F.	12° C. 53·6° F.	14° C. 57·2° F.	16° C. 60·8° F.	18° C. 64·4° F.	20° C. 68° F.	22° C. 71·6° F.	24° C. 75·2° F.	26° C. 78·8° F.	28° C. 82·4° F
			Corrections to be made.																
Height of barometer cistern above sea level: M'tres.	Ft.	In.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
0	0	0	+0·5	+0·3	0·0	−0·2	−0·5	−0·7	−1·0	−1·2	−1·5	−1·7	−2·0	−2·2	−2·5	−2·7	−3·0	−3·2	−3·5
1	3	3	+0·6	0·4	+0·1	0·1	0·4	0·6	0·9	1·1	1·4	1·6	1·9	2·1	2·4	2·6	2·9	3·1	3·4
2	6	7	+0·8	0·5	0·3	0·0	0·3	0·5	0·7	1·0	1·2	1·5	1·7	2·0	2·2	2·5	2·8	3·0	3·2
3	9	10	+0·9	0·6	0·4	+0·1	0·1	0·4	0·6	0·9	1·1	1·4	1·6	1·9	2·1	2·4	2·6	2·9	3·1
4	13	1	+1·0	0·8	0·5	0·2	0·0	0·3	0·5	0·8	1·0	1·2	1·5	1·7	2·0	2·2	2·5	2·8	3·0
5	16	5	+1·2	0·9	0·7	0·4	+0·1	0·1	0·4	0·6	0·9	1·1	1·4	1·6	1·9	2·1	2·4	2·7	2·9
6	19	8	+1·3	1·0	0·8	0·5	0·2	0·0	0·3	0·5	0·8	1·0	1·3	1·5	1·8	2·0	2·3	2·6	2·8
7	22	0	+1·4	1·2	0·9	0·6	0·3	+0·1	0·1	0·4	0·6	0·9	1·1	1·4	1·6	1·9	2·2	2·4	2·7
8	26	3	+1·5	1·3	1·0	0·7	0·5	0·2	0·0	0·3	0·5	0·8	1·0	1·3	1·5	1·8	2·1	2·3	2·6
9	29	6	+1·7	1·4	1·2	0·8	0·6	0·3	+0·1	0·2	0·4	0·6	0·9	1·1	1·4	1·6	2·0	2·2	2·5
10	32	10	+1·8	1·6	1·3	1·0	0·7	0·5	0·2	0·0	0·3	0·5	0·8	1·0	1·3	1·5	1·9	2·1	2·4
11	36	1	+1·9	1·7	1·4	1·1	0·8	0·6	0·3	+0·1	0·2	0·4	0·7	0·9	1·2	1·4	1·8	2·0	2·2
12	39	4	+2·0	1·8	1·5	1·2	1·0	0·7	0·5	0·2	0·0	0·3	0·5	0·8	1·1	1·3	1·6	1·9	2·1
13	42	8	+2·2	1·9	1·7	1·3	1·1	0·8	0·6	0·3	+0·1	0·2	0·4	0·7	0·9	1·2	1·5	1·8	2·0
14	45	11	+2·3	2·0	1·8	1·5	1·2	0·9	0·7	0·4	0·2	0·0	0·3	0·6	0·8	1·1	1·4	1·6	1·9
15	49	3	+2·4	2·2	1·9	1·6	1·4	1·1	0·8	0·6	0·3	+0·1	0·2	0·5	0·7	1·0	1·3	1·5	1·8
16	52	6	+2·5	2·3	2·0	1·7	1·5	1·2	0·9	0·7	0·4	0·2	0·1	0·4	0·6	0·9	1·2	1·4	1·6
17	55	9	+2·6	2·4	2·1	1·9	1·6	1·3	1·1	0·8	0·6	0·3	+0·1	0·3	0·5	0·8	1·0	1·3	1·5
18	59	1	+2·8	2·5	2·3	2·0	1·7	1·4	1·2	0·9	0·7	0·4	0·2	0·1	0·4	0·6	0·9	1·2	1·4
19	62	4	+2·9	2·6	2·4	2·1	1·9	1·5	1·3	1·0	0·8	0·6	0·3	0·0	0·3	0·5	0·8	1·0	1·3
20	65	7	+3·0	2·8	2·5	2·3	2·0	1·7	1·4	1·2	0·9	0·7	0·4	+0·1	0·2	0·4	0·7	0·9	1·2
21	68	11	+3·1	2·9	2·6	2·4	2·1	1·8	1·5	1·3	1·0	0·8	0·5	0·2	0·1	0·3	0·6	0·8	1·1
22	72	2	+3·3	3·0	2·8	2·5	2·2	1·9	1·7	1·4	1·2	0·9	0·6	0·3	+0·1	0·2	0·4	0·7	0·9
23	75	6	+3·4	3·1	2·9	2·6	2·4	2·1	1·8	1·5	1·3	1·0	0·8	0·4	0·2	0·1	0·3	0·6	0·8

Table for converting barometric readings in inches into millimetres.

Inches and Tenths	Hundredths of an Inch.									
	0.	1.	2.	3.	4.	5.	6.	7.	8.	9.
	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.	Mm.
27·0	685·8	686·0	686·3	686·6	686·8	687·1	687·3	687·6	687·8	688·1
·1	688·3	688·6	688·8	689·1	689·3	689·6	689·9	690·1	690·4	690·6
·2	690·9	691·1	691·4	691·6	691·9	692·1	692·4	692·7	692·9	693·2
·3	693·4	693·7	693·9	694·2	694·4	694·7	694·9	695·2	695·4	695·7
·4	696·0	696·2	696·5	696·7	697·0	697·2	697·5	697·7	697·9	698·2
·5	698·5	698·7	699·0	699·3	699·5	699·8	700·1	700·3	700·5	700·8
·6	701·0	701·3	701·5	701·8	702·0	702·3	702·6	702·8	703·1	703·3
·7	703·6	703·8	704·1	704·3	704·6	704·8	705·1	705·4	705·6	705·9
·8	706·1	706·4	706·6	706·9	707·1	707·4	707·6	707·9	708·1	708·4
·9	708·7	708·9	709·2	709·4	709·7	709·9	710·2	710·4	710·7	710·9
28·0	711·2	711·4	711·7	712·0	712·2	712·5	712·7	713·0	713·2	713·5
·1	713·7	714·0	714·2	714·5	714·7	715·0	715·3	715·5	715·8	716·0
·2	716·3	716·5	716·8	717·1	717·3	717·5	717·8	718·0	718·3	718·6
·3	718·8	719·1	719·3	719·6	719·8	720·1	720·3	720·6	720·8	721·1
·4	721·4	721·6	721·9	722·1	722·4	722·6	722·9	723·1	723·4	723·6
·5	723·9	724·1	724·4	724·7	724·9	725·2	725·4	725·7	725·9	726·2
·6	726·4	726·7	726·9	727·2	727·4	727·7	728·0	728·2	728·5	728·7
·7	729·0	729·2	729·5	729·7	729·9	730·2	730·5	730·7	731·0	731·3
·8	731·5	731·8	732·0	732·3	732·5	732·8	733·0	733·3	733·5	733·8
·9	734·1	734·3	734·6	734·8	735·1	735·3	735·6	735·8	736·1	736·3
29·0	736·6	736·8	737·1	737·4	737·6	737·9	738·1	738·4	738·6	738·9
·1	739·1	739·4	739·6	739·9	740·1	740·4	740·7	740·9	741·2	741·4
·2	741·7	741·9	742·2	742·4	742·7	742·9	743·2	743·4	743·7	744·0
·3	744·2	744·5	744·7	745·0	745·2	745·5	745·7	745·9	746·2	746·5
·4	746·8	747·0	747·3	747·5	747·7	748·1	748·3	748·5	748·8	749·0
·5	749·3	749·5	749·8	750·1	750·3	750·6	750·8	751·1	751·3	751·6
·6	751·8	752·1	752·3	752·6	752·8	753·1	753·4	753·6	753·9	754·1
·7	754·4	754·6	754·8	755·1	755·4	755·6	755·9	756·1	756·4	756·7
·8	756·9	757·2	757·4	757·7	757·9	758·2	758·4	758·7	758·9	759·2
·9	759·5	759·7	760·0	760·2	760·5	760·7	761·0	761·2	761·5	761·7
30·0	762·0	762·2	762·5	762·8	763·0	763·3	763·5	763·8	764·0	764·3
·1	764·5	764·8	765·0	765·3	765·5	765·8	766·1	766·3	766·6	766·8
·2	767·1	767·3	767·6	767·8	768·1	768·3	768·6	768·8	769·1	769·4
·3	769·6	769·9	770·1	770·4	770·6	770·9	771·1	771·4	771·6	771·9
·4	772·2	772·4	772·7	772·9	773·2	773·4	773·7	773·9	774·2	774·4
·5	774·7	774·9	775·2	775·5	775·7	776·0	776·2	776·5	776·7	777·0
·6	777·2	777·5	777·7	778·0	778·2	778·5	778·8	779·0	779·3	779·5
·7	779·8	780·0	780·3	780·5	780·8	781·0	781·3	781·5	781·8	782·1
·8	782·3	782·6	782·8	783·1	783·3	783·6	783·8	784·1	784·3	784·6
·9	784·9	785·1	785·4	785·6	785·9	786·2	786·4	786·6	786·9	787·1
31·0	787·4	787·6	787·9	788·2	788·4	788·7	788·9	789·2	789·4	789·7
·1	789·9	790·2	790·4	790·7	790·9	791·2	791·5	791·7	792·0	792·2
·2	792·5	772·7	793·0	793·2	793·5	793·7	794·0	794·2	794·5	794·8
·3	795·1	795·3	795·5	795·8	796·0	796·3	796·5	796·8	797·0	797·3
·4	797·6	797·8	798·1	798·3	798·6	798·8	799·1	799·3	799·6	799·8

Table for converting Minutes to tenths of a Degree.

Minutes.	Tenths of a degree.
0–3	0
4–9	1
10–15	2
16–21	3
22–27	4
28–33	5
34–39	6
40–45	7
46–51	8
52–57	9
58–59	10

EXAMPLE.

Message containing Meteorological Information.

Ice:

—	First Message.	Coded as	Second Message.	Coded as
Date of observation	21	21	22	22
Time of observation	1 p.m.—4 p.m.	5	4 a.m.—7 a.m.	2
Nature of ice or derelict	Single iceberg	1	Field ice	5
Position of ice or derelict ...	Latitude 44° 35′	446	Latitude 42° 58′	430
	Longitude 43° 15′	432	Longitude 47° 3′	470

Weather:

—	First Message.	Coded as	Second Message.	Coded as
Date of observation	21	21	22	22
Position of ship	Latitude 45° 13′ Longitude 42° 5′	825	Latitude 43° 47′ Longitude 46° 33′	863
Direction and force of wind	E.S.E. 5	26	S.W. 2	55
Set and velocity of current	N.W. 2 m-h	82	S.S.E. 1 m-h.	39
Weather	Sky clear	0	Fog	8
Barometer	765·3 mm.	653	753·2 mm.	532
Air temperature	15·3° C.	61	9·8° C.	50
Barometric tendency	Rise ·8	02	Fall 2·7	56
Sea-surface temperature	1·4° C.	014	— ·7° C.	507

The Code of the above message sent to the Meteorological Office would thus be:—

Meteorology: Ice 21514, 46432: 22254, 30470: Weather; 21825, 26820, 65361, 02014: 22863, 55398, 53250, 56507.

ARTICLE II.

SAFETY SIGNAL.

The radiotelegraph stations which have to transmit to ships information involving safety of navigation and being of an urgent character (icebergs, derelicts, cyclones, typhoons, sudden changes

in the position or form of fixed obstructions or of land marks) shall make use of the following signal, called the safety signal, repeated at short intervals ten times at full power:

— — — (T T T)

In principle, all radiotelegraph stations receiving the safety signal, shall, if the transmission of messages by them would interfere with the receipt by any other station of the safety signal and the following safety message, keep silence, in order to allow all interested stations to receive that message. This does not apply to cases of distress.

The safety message shall be transmitted one minute after the safety signal has been sent out, and shall be repeated thereafter three times at intervals of ten minutes.

The Governments of the Contracting States will select the stations which are to send out to mariners safety information of an urgent character.

When the information in question has been sent out by stations performing the time service, it shall be again sent out after the transmission of the time signal and the weather report.

ARTICLE III.

MORSE CODE.

INTERNATIONAL SIGNALS.

These signals may be made at night or in thick weather, either by long and short flashes of light, or by long and short sound signals (whistles, fog-horns, etc.), or during the day by hand flags.

1.—URGENT AND IMPORTANT SIGNALS.

You are standing into danger ... ... · · —
I want assistance; remain by me ... ... · · · —
Have encountered ice ... ... · — —
Your lights are out (*or*, burning badly) ... · — — ·
The way is off my ship; you may feel your way past me ... ... · — ·
Stop (*or*, heave to); I have something important to communicate ... ... · — · ·
Am disabled; communicate with me ... · · — ·

2.—GENERAL SIGNALS.

Meaning.	Signal.	Equivalent Letters and How Made.	How Answered.
Preparative ...	- - - - - - - - - - &c.	A succession of E's in one group	By the general answer T.
Answer ...	—	T (singly).	
Spelling ...	- - — - - - — -	F F in one group.	By the general answer T.
Use International Code of Signals.	— — — — — —	M M M in one group.	By the general answer T.
International Code Flag Sign.	— — — —	M M in one group.	
Break sign ...	- - - -	I I as separate letters.	
Stop	- - - - - -	I I I as separate letters.	
Finish of the message.	- - - - — -	V E as one group.	- — - R. — - - D. As separate letters.
Erase sign ...	- - - - &c.	A succession of E's as separate letters.	By a succession of E's as separate letters.
Annul ...	W W - — — - — —	W W as one group.	By W W as one group.
Repeat word after—(when a single word is required).	I M I - - — — - - W A - — — - — Followed by the word preceding the one required.	I M I as one group. W A as separate letters	By the general answer T.
Repeat all after—(if more than one word is required)	I M I - - — — - - A A - — - —	I M I as one group. A A as separate letters.	By the general answer T.
Repeat all—(if the whole message is to be repeated.)	I M I - - — — - - A L L - — - — - - - — - -	I M I as one group. A L L as separate letters.	By the general answer T.

3.—NATIONALITY SIGNALS.

Meaning.	Signal.	Equivalent Letters and How Made.
American	— - — - — - -	C D as separate letters.
Argentine	— - — - — — -	C G " "
Austro-Hungarian ...	— - — - - - — -	C F " "
Belgian	— - - — - — -	D C " "
Brazilian	— - - -	D E " "
British	- - — -	F.
Bulgarian	— - - - - — -	D F as separate letters
Chilian	— - - — — -	D G " "
Chinese	- — - — -	E C " "
Colombian	- — - -	E D " "
Danish	- - - — -	E F " "
Dutch	- — — -	E G " "
French	-	E.
German	— — -	G.
Greek...	— — — — — - -	M M in one group followed by D.
Italian	— - — - -	C E as separate letters.
Japanese	— - — -	C.
Mexican	- - — - — - — -	F C as separate letters.
Norwegian	— — — — — - — -	M M in one group followed by C.
Peruvian	- - — - — - -	F D as separate letters.
Portuguese	- - — - -	F E " "
Russian	— - -	D.
Siamese	- - — - — — -	F G as separate letters.
Spanish	— — - — - — -	G C " "
Swedish	— — — — -	M M in one group followed by E.
Turkish	— — - — - -	G D as separate letters
Uruguayan	— — - -	G E " "
Venezuelan	— — - - - — -	G F " "

4.—INSTRUCTIONS.

1. THE URGENT AND IMPORTANT SIGNALS may be made without the Preparative Signal being answered if it is supposed that the person addressed cannot reply, or in other special circumstances; but in this case a pause should be made between the Preparative Signal and the message.

2. THE SIGNAL - - — - - - - — - (FF) is used previous to any letters which are intended to spell words.

3. THE SIGNAL — — — — — — (MMM) is used previous to any message sent by means of the International Code of Signals.

4. THE SIGNAL — — — — (MM) means the Code Flag of the International Code of Signals, and is used as indicated in the Code Book.

5. THE BREAK SIGN is used between the address of the receiver and the text of the message, and after the message if the name of the sender is to be signalled.

6. THE STOP is used, where necessary, in the text of the signal.

7. THE ERASE is used to cancel the last word or signal group, sent by mistake.

8. THE ANNUL is used to cancel *all* the message.

9. METHOD OF ANSWERING. Each word or signal group, when understood, is to be answered by one long flash — (T).

If a word or signal group is not answered, the sender is to repeat it until answered by a long flash.

At the end of the message, if understood, the receiver will make - — - — - - (RD).

The Erase and Annul signs are to be answered by their own signs.

10. THE NATIONALITY SIGNAL is made immediately after the answer to the Preparatory Signal has been received, to indicate the nationality of the vessel making the signal. It is answered by the nationality signal of the vessel receiving the message.

SAFETY CERTIFICATE.

Radiotelegraph installation :—

—	Class and numbers required by Articles 33 and 34 of the said Convention.	Actual class and numbers.
Class of ship :—	...	...
Number of Operators of the 1st Class ...	...	...
Number of " " 2nd " ...	...	...
Number of Certificated Watchers ...	—	...

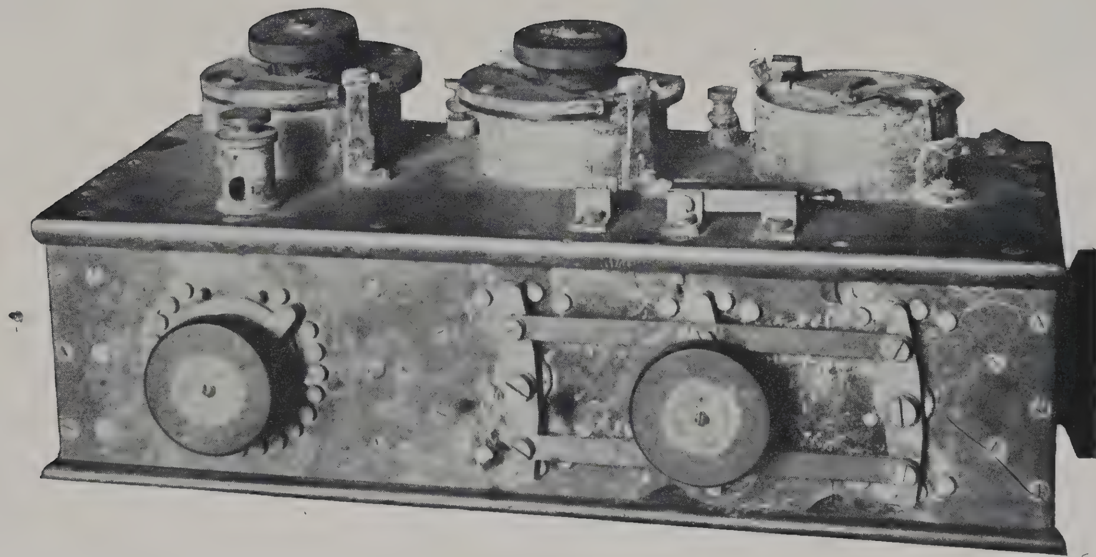
III. That in all other respects the ship complies with the requirements of the said Convention, so far as those requirements apply thereto.

This certificate is issued under the authority of the Government. It will remain in force until

The undersigned declares that he is duly authorised by the said Government to issue this certificate.

(Signature)

Issued at **the** **day of**



MULTIPLE TUNER OF THE S.S. "FALABA" (TORPEDOED ON 28TH MARCH, 1915), AFTER IT HAD LAIN FOR EIGHT MONTHS AT THE BOTTOM OF THE SEA.

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LAWS AND REGULATIONS

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NOTE.—The letters **A**, **B**, **C**, etc., preceding the various numbers in this index refer to the guide printed at the beginning of each country's laws. Thus, in looking up information about operators in Great Britain, we turn to "Operators" in this index and look down the list of countries under that head till we come to "Great Britain." There we find the reference is **D**12, so we turn to the part of the laws and regulations headed "Great Britain" and consult the guide at the beginning of this part, which tells us that "**D**" is the form of licence for ship stations, and therefore "**D**12" means Section 12 of this licence. To facilitate reference, these guide letters, **A**, **B**, **C**, etc., are printed in the margin at the beginning of each law or regulation. Where a country has only one Act referred to no such guide letters are needed, the number of section or paragraph alone being referred to in such cases.

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Australia	A4, A10; **D**231 (5).
Austria	A2; **B**3, **B**4; **D**1; **E** (3).
Bahamas	2.
Barbados	A2 (6); **B**2 (1), 3 (1); **C**3.
Belgium	1, 8.
Bermuda	A1-3; **B**1.
Brazil	A159; **C**.
British Guiana	A3.
British Honduras	A3; **B**1.
British North Borneo	3, 6.
Canada	A2 (a), A3, A5, A10, A11; **B**4, 5; **C**2 (2), **C**19.
Ceylon	A1; **B**1, 5.
China (Hong Kong)	A3, A4, A6.
China (Weihaiwei)	1.
Chinese Republic	3.
Curaçao	Netherlands **D**1-8.
Denmark	A1-4; **B**2, 11.
East Africa Protectorate	3, 6.
East Indies (Dutch), Netherlands	E1-3, 14.
Egypt	2.
Falkland Islands	1.
Fiji	A1-4; **B**2
France and Algeria	2, 3, 4, 5, 7.
Gambia	Aiv., v., vi.
Germany	A2 (3b); **B**2 (b); **C**15.
Gibraltar	A2, A3; **B**2.
Gold Coast Colony	A2, A4; **B**5.
Great Britain	A1, A3, A5; **C**4 (2), **C**5; **D**23; **E**4, **E**17; **G**16, **G**17; **J**4 (3), (4).
Grenada	2.
Holland—*see* Netherlands	
Hungary	1, 3, 4, 7, 8, 9, 19, 20, 21.
India	1, 2.
Italy	A2; **B**1-7, **B**12, **B**17
Jamaica	A2.
Japan	A16 (a).
Mauritius	1-5.
Netherlands	A; **B**1; **C** (3).
Newfoundland	A1; **C**1 (3), **C**6.
New Zealand	A162; **B**4; **C**2, **C**27; **E** preamble, 5, 7.
Nigeria (Northern)	2, 4.
Nigeria (Southern)	A3, A5.
Norway	A1; **D**3, **D**4, **D**13-15.
Nyasaland Protectorate... ...	2, 3.
Rhodesia (Southern)	A5, 6; **B**.
Russia	A1-3; **B**1-20; **C**.
St. Helena	A1.
St. Lucia	A3, A5.
St. Vincent	A3, A5.

COMMUNICATION—(1) Call Signals.

Austria	**B** (10).
Canada	**B**13, 15, 25, 28, 29.
Great Britain	**F**1; **G**16 (3).
Norway	**D**9.
Spain	**C**13 (2).
United States of America ...	**D** part 4 (4).

COMMUNICATION—(2) Codes.

Austria	**E**8.
Denmark	**B**16, 17.

COMMUNICATION—(3) Compulsory Interchange of Radiograms.

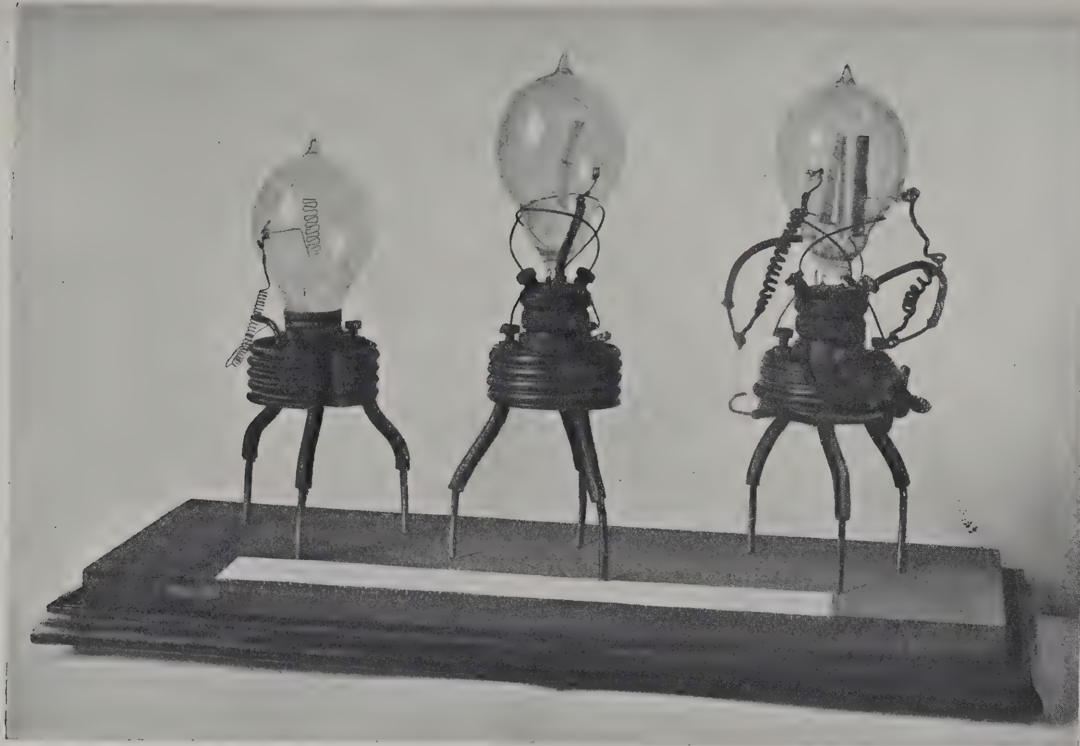
Austria	**B**9.
Canada	**C**5.
Germany	**C**14.
Hungary	13.
New Zealand	**C**3.
Norway	**D**6.
United States of America ...	**C** (Sec. 4) 11.

COMMUNICATION—(4) Co-operation with Land Lines and Cables.

Argentina	**B**21, 27, 28.
Canada	**A**5.
Spain	**C**31-35.

COMMUNICATION—(5) Distress Signals.

Argentina	**B**24, 28, 45.
Austria	**A**5.
British North Borneo	6 (ii.).
Canada	**C**8.
China (Hong Kong)	**A**6 (2); **B**6.
East Africa Protectorate ...	6 (2).
Fiji	**B**4.
Gambia	**B**3.
Gibraltar	**C**4.
Gold Coast Colony	**C** (vi.).
Great Britain	**C**7; **D**10 (1), 11; **E**8.
Holland—*see* Netherlands	
Hungary	13.
Italy	**D**7.
Jamaica	**C** (B) 3.
Japan	**A**8.
Netherlands	**C**1.
Newfoundland	**D**8.
New Zealand	**B**5; **C**16.
Nigeria (Southern)	**B** (vi.).
Norway	**D**7.
St. Helena	**B**4.
St. Lucia	**B**6.
St. Vincent	**B**6.
Sierra Leone	**B** (6).
Somaliland Protectorate ...	**B** (vi.).
Spain	**C**9.
Straits Settlements	**A**6 (2); **B**4.



Fleming Valves.

PHOTOGRAPH OF THE ORIGINAL OSCILLATION VALVES, USED BY DR. J. A. FLEMING, F.R.S., IN OCTOBER, 1904, AS RECTIFIERS AND DETECTORS OF THE HIGH-FREQUENCY OSCILLATIONS EMPLOYED IN WIRELESS TELEGRAPHY.

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STATIONS.—(*Continued.*)

Ship Installations—(1).—(*Continued.*)

Barbados	**B** (3); **C** (1) and (2).
Bermuda	**B** 1-4.
Brazil	**A** 159, 160.
British Guiana	**B** 1 (1), (2).
British Honduras	**B** i., 5, 8; ii., 34-67.
Canada	**A** 3; **B** i. to **B** v.; **C** 1-20.
Ceylon	**A** 1 (g); **A** 1 (i.); **B** 2 (b), 3, 5, 7, 8.
China (Hong Kong)	**B** 2 (b), **B** 3, 4.
Denmark	**A** 2, 3; **B** 2-13, 19, 22.
Falkland Islands	2.
Fiji	**A** 4; **B** 1-4.
Gambia	**A** iii.; **B** 1, 2.
Germany	**C** 1-22.
Gibraltar	**B** 2; **C** 1-5.
Gold Coast Colony	**B** 4; **C** (i.-vi.).
Great Britain	**A** 1 (5), **A** 3; **B** 1-4; **D**; **G** 15-17; **J** 4 (1) to (6).
Hungary	1-21.
Italy	**B** 1, 19, 20; **C**; **D** 1-15.
Jamaica	**C** (B) 1-5.
Japan	**A**; **B**.
Mauritius	3.
Newfoundland	**C** 1-6.
New Zealand	**C** 1-29; **E** 1-8.
Nigeria (Southern)	**B** (i.-vi.).
Norway	**D** 1-17.
Portugal	**A** 1-9; **B** 1-34.
Russia	**C**.
St. Helena	**A** 1, 2; **B** 1-4.
St. Lucia	**A** 4; **B** 1-6.
Siam	5, 6, 8.
Sierra Leone	**A** 4; **B** 1-6.
Somaliland Protectorate ...	**A** 4; **B** (i.-vi.).
Spain	**B** 7; **C** 12, 15, 26, 28-32; **D** 7-11.
Straits Settlements	**B** 1-4.
Sweden	**C**.
Trinidad and Tobago	**A** 2; **C** 1-5.
United States of America ...	**A** 1-4; **B**; **C** (Sec. 4) 17; **D** part 1 (B); **D** part 2 (I.); **D** part 3 (I.); **D** part 4.
Uruguay	1-7.

Ship Installations—(2) Auxiliary Apparatus and Power.

Argentina	**B** 43.
Australia	**D** 231 (2) c.
Germany	**C** 3.
Great Britain	**D** (I.) d.
Hungary	4.
Italy	**D** 5-12.
Portugal	**B** 11.
Sweden	**D** 59.
United States of America ...	**A** 1; **B** Sec. 3, par. 5.

STATIONS.—(*Continued.*)

Ship Installations—(7) Licences.

Argentina	A6; B13 (a), 19, 35, 41, 47-56; C3.
Australia	B3-10.
Austria	B1-10.
Belgium	1-4.
Bermuda	A1-3.
British Guiana	A3; B1 (1).
British North Borneo	3, 4.
Canada	A3; B ii., 34-67; C1-20.
Ceylon	A1 (c); B1, 2 (b).
China (Hong Kong)	A3, 4; B1, 2 (b).
China (Weihaiwei)	1.
Denmark	B2, 3.
East Africa Protectorate ...	4.
Falkland Islands	1, 2.
Germany	C22.
Gibraltar	A2.
Gold Coast Colony	B3 (2).
Great Britain	A1 (2); D, D19, D21.
Hungary	1, 8, 17, 18.
Italy	B7-16, 21; D6, 8-9.
Mauritius	2.
Newfoundland	A1.
New Zealand	C2, 22, 23, 26, 29.
Norway	D2, 3, 16.
Portugal	B2.
St. Lucia	A3.
St. Vincent	A3.
Siam	5.
Spain	C15.
Sierra Leone	A3.
Straits Settlements	A4.
United States of America ...	B Sec. 2, 1; C1, 2; D part 1 (B); D part 2 (Sec. 1); D part 3 (Sections I. and III.); D part 4.

Ship Installations—(8) Operators.

Argentina	B59-65.
Austria	B6; F1-22.
Canada	A6; B ii., 75 to 83, 87.
Denmark	B3 (d), 7.
Germany	C6, 7, 9-13.
Great Britain	D12; G16, 17.
Hungary	8, 10.
Italy	B17, 18.
New Zealand	C17.
Norway	D11.
Portugal	A2; B12-21, 33.
Spain	C15.

STATIONS.—(*Continued.*)

Ship Installations—(11).—(*Continued.*)

Barbados	C1.
Bermuda	B1.
Canada	B i., 5; B ii., 9 to 12, 19 to 22, 27, 73; C4, 7.
Ceylon	A1 (g), (h), (i); B5.
China (Hong Kong)	B4.
Denmark	B21, 22.
Falkland Islands	2.
Gibraltar	B2; C2.
Gold Coast Colony	B4; C (III.).
Great Britain	D (II.), D2.
Italy	B19.
New Zealand	C8, 9.
Nigeria (Southern)	A4; B (III.).
Norway	D8.
St. Helena	B2.
St. Lucia	A4; B3; C1-3.
St. Vincent	A4; B3.
Siam	6.
Sierra Leone	A2; B2.
Somaliland Protectorate ...	A4; B (III.).
Straits Settlements	B2.
Sweden	C.
Trinidad and Tobago	A2; B1-3; C2.
United States of America ...	C1.

Shore Installations—*see* "STATIONS" (Coast).

Stations (General) Conditions for the Establishment of

Argentina	A4-6; B13, 14, 15, 35 58; C, preamble and 1-4.
Australia	A4, 5; and C.
Austria	A1, 2; E12.
Bahamas	2.
Barbados	2.
Belgium	1, 3, 4.
Bermuda	A1.
British Guiana	A3; B1 (1).
British Honduras	A1.
British North Borneo	4.
Canada	A3, 13; B ii., 37-51.
Ceylon	A; B1.
China (Hong Kong)	A3 and 4; B1.
China (Weihaiwei)	1.
Chinese Republic...	2, 3, 15.
Denmark	B1, 2, 3.
East Africa Protectorate ...	3, 4.
Egypt	1.
Falkland Islands	1.
Fiji	A3.
France and Algeria	1-8.
Gambia	A i., ii., iii.; C2, 3, 4.

THE VARIOUS ACTS, DECREES, REGULATIONS, ETC., REFERRED TO IN THE FOLLOWING LAWS ARE ENUMERATED AT THE BEGINNING OF EACH COUNTRY'S LAWS AND NUMBERED BY CAPITAL LETTERS OF THE ALPHABET. IT IS THESE LETTERS WHICH ARE REFERRED TO IN THE INDEX PREFIXED HERETO.

ARGENTINE REPUBLIC.

A.—Law of September 16th, 1913.
B.—Regulations.
C.—Temporary Measures.

IN the Argentine Republic the administration of wireless telegraphy rests in the hands of the Minister of Marine and of the Minister of the Interior, whose respective spheres of responsibility are defined in the Regulations attached to the Law governing the subject. It is the duty of the Director-General of Posts and Telegraphs to enforce the Laws and Regulations issued by the above-mentioned Ministers.

The Decree of July 5th, 1913, printed in former editions of the YEAR BOOK has been superseded by the Law of September 16th, 1913, and the Regulation attached thereto, the text of which will be found below.

A LAW NO. 9,127 PASSED BY THE NATIONAL CONGRESS ON SEPTEMBER 16TH, 1913.

ART. 1.—The wireless service within the national territory, and for international communications within a minimum distance of 1,000 kilometres, shall be exclusively under the control of the State.

ART. 2.—The executive shall attend to the erection of wireless stations within the national territory, and shall so select the sites for the coast ones that all ships sailing near our coasts and navigating our rivers may always be in touch with them.

ART. 3.—The sum of $400,000 national currency are hereby allocated to the above. This amount will be charged to General Expenses.

ART. 4.—The use of wireless apparatus in perfect working order is hereby declared compulsory for all ships calling at the ports of Argentine carrying fifty or more passengers, including the crew, on and after ninety days have elapsed since the promulgation of this law.

ART. 5.—Wireless apparatus handled by skilled operators must have at all times a transmission power of not less than 200 kilometres for river craft, and not less than five hundred kilometres for sea-going vessels.

ART. 6.—No ships will be allowed to leave port until the prescriptions of Arts. 4 and 5 have been complied with, and should the

captain or the officer in charge try to elude or contravene this regulation, the local marine authority shall impose a fine of from one thousand to five thousand pesos. The party so fined can appeal to the federal magistrate of the district where the contravention has been committed. A double fine will be the penalty for a repetition of the offence.

ART. 7.—The Executive will promulgate the regulations in accordance with this law.

ART. 8.—The above Act of Parliament shall be communicated to the Executive.

The above was approved by the Argentine Congress in the city of Buenos Aires on the sixteenth day of September in the year of our Lord nineteen hundred and thirteen.

B REGULATIONS.

Promulgated October 24th, 1914.

ART. I.—The national territory is hereby divided into two zones for the purposes of jurisdiction and regularisation affecting the service of radiotelegraphic installations. The aforesaid zones are as follows :—

1. The *Maritime Zone*, which includes all ship stations in the maritime territorial waters and navigable rivers, besides all land stations situated within one hundred kilometres from the sea and River Plate coasts and those situated within fifty kilometres from the banks of any other navigable rivers.

2. The *Terrestrial Zone*, which includes all other installations on national territory which are not covered by the above.

ART. 2.—(*a*) The Maritime Zone is under the jurisdiction of the Minister of Marine, who is responsible for the control of the Public Radiotelegraphic Service and who prescribe sthe rules and regulations for wireless service in this particular zone.

(*b*) The Minister of Marine shall also undertake the duty of transmitting all information of any nature which may be required by them to the International Bureau of Berne.

ART. 3.—(*a*) The Terrestrial Zone is under the jurisdiction of the Minister of the Interior, who controls the Public Radiotelegraphic Service and who prescribes the rules and regulations for wireless in this particular zone.

(*b*) If Martial Law is declared, all installations in this zone shall be placed under the control of the War Office.

ART. 4.—Other Executive Offices can order the installation of wireless stations for their exclusive use, but in such cases the working of such installations must be authorised by the Minister exercising control in the respective zones, and the rules and regulations prescribed for the latter must be observed.

ART. 5.—All wireless installations erected in the national territory must observe the international rules and regulations adhered to by the Government of the Republic, and the General Law regulating the Telegraph Service must be observed in all matters appertaining to the Public Radiotelegraphic Service.

Regulations Affecting All Installations on National Territory.

Art. 6.—The power to be used in all installations on land will be limited to that necessary for communication with the nearest station, and in no circumstances shall the aerial power exceed 3 kilowatts, Coast installations which must have high power in order to communicate at long distances are excluded from this limitation.

Art. 7.—The official wave-length will be 600 metres.

The wave-length for private installations authorised by the Government must not exceed 200 metres.

Art. 8.—All installations open to public service must receive all messages sent by stations under the control of any Ministry or by any of the National Telegraph offices, provided that the regulations established by each administration regarding the radiograms which may go over their lines, are complied with at the original stations from which the messages are radiated.

Art. 9.—No installation, either for the reception or transmission of wireless messages can be established without the previous authority of the Minister having under his control the zone selected for the erection of the station.

Art. 10.—In order to obtain the permit referred to in the preceding Article, the private installations must fulfil the following requirements :—

(1) The primary transmitting power must not exceed 50 watts.

(2) The wave-length must not exceed 200 metres.

(3) The receiver must not allow of the reception of waves of a length exceeding 200 metres.

(4) The installation must not be used for any interchange of messages in the public service. It will be devoted to experimenting, and only when in the judgment of the Government no harm or disturbance would arise from its use to the nearest national stations can the installation send or receive special messages.

Art. 11.—Anyone infringing the above rules will be penalised in accordance with the penalties established in the General Law relating to the National Telegraph Service.

Art. 12.—Private installations authorised in accordance with Article 10 must be inspected by the official inspectors, who are entitled to all the information and data they may demand. These installations must be registered and the wireless apparatus must be sealed by an inspector. The Minister exercising jurisdiction in the respective zone can order at any time the closing of authorised private wireless installations.

Public Radiotelegraphic Maritime Service.

Art. 13.—The Director-General of Supplies at the Ministry of Marine shall have under his control the Public Radiotelegraphic Maritime Service, and his duties will be as follows :—

(*a*) He shall supervise all coast stations and ships' stations after installation, both of national and foreign register, calling at national ports, and shall also supervise all coast stations, as prescribed in Article 2 of Law 9127.

(*b*) He shall control the service of the said stations and will draft the regulations for same, taking care that the rules herein established and the international Conventions accepted by the National Government are duly fulfilled.

(*c*) He shall see to it that all regulations concerning rates, discounts and reimbursements, as well as any others that may be later on prescribed by the Post and Telegraph Office regarding the requirements of messages sent by the National Telegraph lines or by the wireless land stations are faithfully complied with.

(*d*) He shall forward to the Office of Posts and Telegraphs all claims made to the Prefect-General of Ports by Steamship Companies, ship captains or passengers referring to rates, discounts and reimbursements.

(*e*) He shall issue through the Office of the Prefect-General of Ports the permits for the erection of wireless on board those ships which may have obtained leave to do so in accordance with these Regulations.

(*f*) He shall issue licences to the wireless telegraphists, operating at all stations working within the Maritime Zone, so soon as the conditions affecting such licences have been fulfilled in accordance with these Regulations.

(*g*) He shall cancel such licences and permits granted to stations and operators within the Maritime Zone as it may, for any reason, be found necessary to withdraw.

(*h*) He shall enforce, through the Office of the Prefect-General of Ports, the payment of all fines imposed on shipping companies or ships, and shall deposit the said fines in the National Bank to the order of the Director of Posts and Telegraphs.

(*i*) He shall have it in his power to authorise the installation of wireless by private individuals or corporations within the Maritime Zone in accordance with Article 10 of these Regulations.

ART. 14.—The head of the Public Maritime Wireless Service shall act jointly with the Director of Posts and Telegraphs in the following matters :—

(*a*) In all matters referring to wireless stations installed by the Ministry of Marine.

(*b*) In all matters referring to rates, discounts and reimbursements of the Public Wireless Maritime Service in order to obtain a monthly settlement of accounts by the shipping companies or ship captains with the Office of Posts and Telegraphs in conformity with the schedules prepared by the latter.

(*c*) In the investigation of any questions that may arise for consultation from the Wireless International Service. In all such cases, the Office of Posts and Telegraphs shall communicate with the Berne International Office and with the foreign administrations and authorities concerned.

ART. 15.—The Director of Posts and Telegraphs shall deal directly with the General Director of Supplies for the provision of material in all cases relating to the Maritime Wireless Service.

THE GENERAL OFFICE OF THE PREFECT-GENERAL OF PORTS.

ART. 16.—The duties of the Prefect-General of Ports will be as follows :—

(*a*) He shall give effect to the provisions made in Articles 4, 5 and 6 of Law 9127 and shall deposit at the Bank of the "Nación Argentina" the fines imposed for the non-fulfilment of said provisions. The money so deposited must be placed to the order of the Director of Posts and Telegraphs.

(*b*) He shall receive all complaints regarding unsatisfactory service in the coast and ship stations, and shall forward them to the head of the Maritime Wireless Service.

(*c*) Should any complaints be made upon the arrival in port of any vessel, the Prefect shall collate the evidence and forward it to the head of the Naval Wireless Service, and he shall act in the same manner should the complaints be made in writing.

(*d*) He shall prevent the departure of any ship which may have failed to make the necessary deposit at the National Bank (to the order of the Director of Posts and Telegraphs) of the fines imposed in accordance with Article 6 of Law 9127.

(*e*) Both upon the arrival and departure of merchant ships the Prefect shall have the wireless installations inspected in order to ascertain whether they are in perfect working order and whether the power of the apparatus is that fixed by Law 9127.

ART. 17.—All matters referring to ship stations are under the control of the Maritime Wireless Service Office.

ART. 18.—Besides the inspection and control of ship stations in territorial waters and on craft of all register the general office of the Prefect-General of Ports must attend to the following :

(1) The dismantling of the apparatus of the wireless installation as soon as the ship has moored or anchored.

(2) He shall ascertain whether the wireless operator or operators have licences corresponding to the installation they are working, in conformity with Article X. of the Service Regulations annexed to the London Convention.

(3) He shall receive any complaints made by Ship Captains regarding the wireless national stations, and shall forward them to the head of the Maritime Wireless Service, so that the latter may take steps to investigate and deal with such complaints.

(4) In such cases as those covered by Article XII. of the Service Regulations above mentioned, the Prefect-General of Ports shall act jointly with the Director-General of Supplies of the Ministry of Marine in order to give effect to the provisions of the said Article.

CONCESSIONS GRANTED TO PRIVATE WIRELESS INSTALLATIONS.

ART. 19.—Law 9127, having been passed with the object of nationalising of the wireless service, the installation of high-powered wireless stations by private individuals or corporations shall only be allowed in the national territory when such installations are destined for trans-ocean communication.

Art. 20.—The granting of the concession spoken of in the previous Article is hereby left at the option of the Minister having under his jurisdiction the zone wherein the station is to be erected.

When the site selected happens to be within the maritime zone, the Minister of the Interior shall also be consulted on all matters concerning rates, discounts and reimbursements.

Coast Stations.

Under the control of the head of the Maritime Wireless Service and open to the Public.

Art. 21.—As far as inland stations are concerned the same Regulations shall apply as have been specified in these Regulations for those controlled by the Minister of Marine.

Art. 22.—Coast stations not open to the public may or may not appear in the Official Nomenclature Lists at the option of the Minister of Marine.

Art. 23.—Messages cannot be directly received from the public at the coast wireless stations open to the public. Such messages must be presented for transmission at the nearest telegraph office and thence they will be transmitted by telegram to the radiotelegraphic station.

The wireless station of "Año Nuevo," where no telegraph or post office exists, is excepted from the above prohibition.

Wireless messages for transmission from "Ushuaia" must be presented at the post office, and will be sent from the latter by messenger to the wireless station.

Art. 24.—The only private wireless messages which will be received directly (if prepaid) at the coast wireless stations under the jurisdiction of the Ministry of Marine will be those sent by the personnel of the Navy when the said messages are addressed to the Ministry of Marine.

Art. 25.—The following shall be the *Controlling Stations* for the supervision of the wireless service in general, and particularly for the fulfilment of this Regulation, and of those of the London Convention at all coast and ship stations of the Maritime Zone:

Darsena Norte Station.—This station will control the port of Buenos Aires and its vicinity.

La Paz Station.—This station will control the port of Rosario and its vicinity.

Rio Santiago Station.—Will control the port of La Plata and its vicinity.

Puerto Militar.—This station will control its own port besides Bahia Blanca and its vicinity.

Art. 26.—An inspector appointed by the Ministry of Marine shall control the wireless service at Tierra del Fuego.

Art. 27.—For the purpose of the accounts the coast stations shall be considered as terminal stations for all messages sent to ship stations and as stations of origin for all messages coming from the ships.

ART. 28.—The coast stations shall give immediate priority to messages of distress sent by ships, and shall forward them over the land lines as urgent messages.

Official messages shall have priority over private ones.

NATIONAL WARSHIP STATIONS.

ART. 29.—Warship and coast stations shall use for official messages the maximum wave-length possible for their aerials, and should they have to transmit messages to Argentine merchantmen or to foreign merchant steamers they must use the wave-lengths specified by the London Convention and by these Regulations.

ART. 30.—Messages from ships belonging to the Argentine Navy or to any other department of the administration shall be exempted from the maritime tolls, but they must pay the land line charges.

ART. 31.—Payment on private wireless messages sent from naval vessels or from any others belonging to the State shall be made as follows:

(1) On ships belonging to the Navy the operator shall prepare a receipt stating the number of words to be transmitted and the cost of the message. The sender of the message shall, in his turn, deliver that statement to the ship's purser. This officer shall collect the money and stamp the statement and shall send a duplicate of the message to the wireless station for its transmission. The other copy, bearing the ship's stamp, shall be put on the files by the operator.

(2) On ships belonging to other departments of the administration, arrangements shall be made between the Ministry having control and the Director-General of Posts and Telegraphs regarding rates, discounts and reimbursements.

ART. 32.—The rendering of accounts by reason of tolls collected on ship stations or at any other dependent on the National Navy must be done in the manner prescribed in the respective Regulations as set forth herein.

ART. 33.—The Director-General of Posts and Telegraphs shall be responsible for any claims arising from faulty liquidation of accounts, and must pass on any such matters to the Head of the Public Maritime Wireless Service for him to deal with.

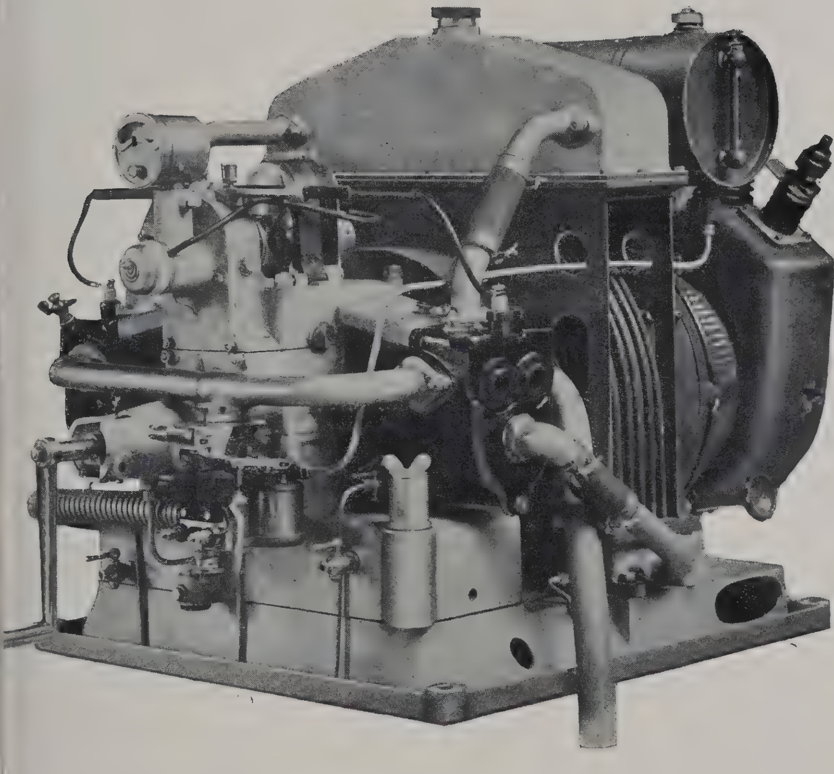
COAST AND SHIP STATIONS INDEPENDENT OF THE MINISTRY OF MARINE.

ART. 34.—Any Ministries controlling ships fitted up with wireless shall liquidate their accounts in accordance with the arrangements with the Post and Telegraph authorities through the intermediary of the Home Minister.

WIRELESS ON MERCHANTMEN.

ART. 35.—All merchant vessels, whether mechanically propelled or otherwise, carrying fifty or more persons must be fitted with a wireless installation in perfect working order, except in the cases referred to in Articles 38, 39 and 40 of these Regulations.

The above applies to all craft in similar conditions entering or leaving Argentine ports.



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Art. 36.—Wireless apparatus in charge of an efficient operator must have at all times a transmitting power of no less than 200 kilometres for river craft and of no less than 500 for sea craft.

Art. 37.—No ships will be allowed to clear when the above provisions have not been duly complied with, and should captains or ship masters endeavour to avoid or contravene this rule the Port Authority can impose a fine of no less than 1,000 pesos and not exceeding 5,000. Those penalised in that way can appeal to the Federal Court having jurisdiction on the locality where the fault has been committed. The fine will be doubled in cases of repetition of the offence.

Art. 38.—Ships exclusively navigating the rivers of the Republic are exempted from the obligation of carrying wireless on board, but those plying between Argentine and Uruguayan Ports on the River Plate and those employed in the coasting trade must carry radiotelegraphic installations.

Art. 39.—The following are the exceptions to the rule established by Article 35 :

(1) Those ships which by accident or under exceptional circumstances carry fifty or more passengers, either because the captain has been obliged to get extra help in order to replace the sick members of the crew, or because he has taken aboard the passengers and crew of some vessel in distress.

(2) Those ships on which by reason of the route they follow or because of the conditions in which they set out to sea, it may be considered that the carrying of a wireless installation would be useless and superfluous.

(3) Those ships where the number of passengers may be raised by exceptional or accidental circumstances to 50 or more, owing to their having received on board these additional passengers in the course of the voyage for the purpose of transhipment, with the additional proviso that such vessels do not go farther than 150 miles from the nearest coast.

(4) Sailing ships of primitive construction, such as pontoons and rafts, which it is impossible to fit with wireless.

Art. 40.—Vessels which have started their voyage without meeting the requirements of Argentine law with regard to wireless telegraphy cannot be allowed to send or receive messages even if, by reason of bad weather or through *force majeure*, they are compelled to seek refuge in Argentine ports.

Art. 41.—All ships carrying wireless installations are divided into three classes according to the classification made regarding ship stations in Article XII. of the Regulations annexed to the Radiotelegraphic Convention signed in London on July 5th, 1912. These classes are :

FIRST CLASS.—Vessels carrying a permanent wireless service All vessels fitted to carry 25 or more passengers are included in the *First Class*.

(1) If their average speed is of 15 knots or more.

(2) If they have an average speed of over 13 knots ; but only provided they carry 200 or more persons (passengers and crew), and provided also that they traverse a distance of more than 500

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nautical miles between two ports of call. These ships, however may be classified under the second class provided that they maintain a continuous watch.

SECOND CLASS.—Vessels having a limited wireless service.

Those ships fitted to carry 25 or more passengers which for some other reasons may not have been included in the first class are included in this second class.

All ships of the second class must, whilst at sea, keep continuous watch during seven hours every day, and watch also for ten minutes at the beginning of each of the remaining seventeen hours.

THIRD CLASS.—To this class belong those ships carrying a wireless installation without any fixed working hours or not included in the first and second classes.

The owner or builder of a ship included in the second or third class has the right to demand that in the certificate of safety issued to him mention be made of the fact that the ship belongs to a higher class, provided the vessel fulfils the requirements laid down for the higher class.

ART. 42.—Ships carrying wireless must keep a constant watch in the following cases :—

(1) Passenger ships running to Montevideo with more than 100 passengers on board.

(2) All ships belonging to the first class.

(3) Ships belonging to the second class, whenever they are at a distance of over 500 miles from the nearest coast.

(4) Ships carrying more than 50 passengers and which, by reason of their movements, are obliged to navigate at a distance of over 1,000 miles from the nearest coast.

(5) Fishing craft, including whalers, on board of which wireless telegraphy must be carried, are not obliged to keep a continuous watch.

The continuous watch above referred to must be carried out by one or more qualified telegraphists, as provided for in Article 10 of the Regulations annexed to the Convention ; or, if necessary, by one or more certificated radio operators.

Should, however, some mechanical or automatic device be invented for performing such continuous watch, the services of such device may be utilised, provided that the previous consent of the competent authority has been obtained.

ART. 43.—Any ship which must carry wireless and which is classified in the first or second class must have an emergency installation, in accordance with Article 11 of the Regulations annexed to the Radiotelegraphic Convention.

In every case, the emergency installation shall be placed in its entirety on the upper deck of the ship and should be located as high up as possible.

The emergency installation must have a source of energy of its own, must be of such a nature that it can be set in motion very rapidly, and must work for a minimum of six hours and possess a range of 150 kilometres.

This emergency installation is not required in the case of those ships whose *normal* installations fulfil all the requirements demanded by this Article (as enumerated in the preceding clause).

The licence referred to in Article 9 of the Regulations annexed to the Convention cannot be granted if the installation fails to comply with the requirements demanded by the said Convention and by the present Regulations.

ART. 44.—All points raised in the Radiotelegraphic International Convention and its Regulations which affect ship stations, the transmission of messages, and the issue of certificates to wireless operators, are governed by the following :

(1) The Rules laid down in the above-mentioned Convention and its Regulations, as well as all the amending Regulations which may from time to time be substituted for them.

(2) Any supplementary Regulations affecting these various points which may be inserted in addition to the above.

ART. 45.—The captains of all ships hearing the signal of distress sent by any vessel in distress must immediately proceed to the rescue of such vessel.

Captains of ships in danger have the right to choose amongst the vessels answering the distress call the ship or ships which, in his judgment, are in the best position to render assistance, but he must not exercise this right without consulting, if possible, with the captains of the said ships. The latter must proceed at full speed to the place of the catastrophe.

The captains of ships which must go to the rescue shall be released from their duty in this respect so soon as the captain or captains of the vessels selected to render assistance inform them that they are able, unassisted, to cope with the situation, or when the captain of one of the ships which arrives at the place of the disaster informs them that their services are not required. In such cases the reasons which may lead to such conduct must be registered in the log book.

ART. 46.—All ships under the national flag cruising in the North Atlantic must follow the instructions of the Regulations annexed to the Safety of Life at Sea Convention in all matters regarding the weather, the presence of icebergs, etc.

RULES FOR WIRELESS INSTALLATIONS ON NATIONAL MERCHANTMEN.

ART. 47.—All Shipping Companies whose vessels are included in the Regulations laid down in Wireless Law No. 9127 must obtain a permit from the Ministry of Marine and through the Prefect-General of Ports for the installation of wireless stations on their ships.

ART. 48.—Wireless stations on ships devoted to the conveyance of passengers will be classified as belonging to the first class (see Article 41 above), and wireless stations on cargo boats will be included in the second class (Article 13 of the Service Regulations annexed to the Wireless Convention).

When Shipping Companies apply for permission to install wireless in their vessels they must indicate the class occupied by such vessels, and this classification must be verified by the Office of the Prefect-General of Ports before forwarding the application to the Director-General of Material.

ART. 49.—As soon as the permit has been granted, and immediately after the stations have been erected on the ship, the company must notify the Prefect-General of Ports, so that the latter may—after previous inspection by the wireless inspector—issue the corresponding licence through the Chief of the Maritime Wireless Service. This licence will be handed over as soon as the charge of 5 pesos (national currency) for the defrayment of expenses has been paid.

ART. 50.—The Ministry of Marine will grant the licence if the wireless installation fulfils all the requirements of the law in the matter of range and also if the installation belongs to a system permitting of its being tuned to the wave-lengths specified in the London Wireless Convention, within an approximation of 5 per cent.

ART. 51.—Wireless installations on ships belonging to the national merchant service must be furnished with the following papers:

(1) The licence authorising the installation.

(2) One copy of the London Wireless Convention.

(3) One copy of the Wireless Law.

(4) One copy of the Wireless Regulations.

(5) The International Directory of Wireless Stations.

(6) Radiotelegraphic forms.

(7) One copy of the standing wireless rates, which must be kept where it can be plainly seen.

(8) One slate, placed outside the wireless cabin, so that the names of those stations within range may be noted thereon for the information of the public.

ART. 52.—Wireless installations on ships of national register must be of such a character as to be able to receive the messages radiated to them through the apparatus of the wireless stations belonging to the State.

ART. 53.—The tariff of 25 cents (national money) for each word and of 2 pesos 50 cents as the minimum for each radiotelegram (including the telegraph service as established by Decree dated November 17th, 1911) will be the standing tariff for national ships serving Argentine coastal ports, both maritime and fluvial, until and unless new rates are adopted.

ART. 54.—Captains and ship companies will settle their accounts monthly with the Administration of Posts and Telegraphs in conformity with the liquidation schedule which the latter will prepare and provide.

ART. 55.—All ship stations, whatever the class and nationality of the vessel, must be closed for transmission at the ports of Buenos Aires, Rosario, La Plata, and Bahia Blanca, as soon as the ship is anchored or moored, and the station cannot be reopened for the transmission of messages until the ship is at a distance of five miles from the coast.

ART. 56.—The first contravention of the above Regulation will be registered against the offender by the Office of the Prefect-General of Ports, and any repetition thereof will be punished by the said Office with a fine of 100 pesos (national money) for each offence.

Art. 57.—Foreign ships belonging to countries which are not signatories to the London Convention can exchange radiotelegrams with coast and ship stations, providing that applicatons to that effect should have been made by the agents representing the companies to which those foreign ships belong and after the necessary formalities have been complied with.

Art. 58.—The above-mentioned stations must conform to all the rules herein established as well as to those of the London Radio Convention.

Maritime Wireless Operators.

Art. 59.—Papers illustrative of the examinations which must be passed in order to qualify as a maritime wireless operator are attached to these Regulations. These examinations have been organised in accordance with the provisions of the London Wireless Convention.

Art. 60.—In accordance with the rules established by the Chief of the Maritime Wireless Service, the licences will be valid for employment in the stations of both zones.

Art. 61.—All operators of ships of national register must hold the licence corresponding to their class, granted by the Ministry of Marine, and the said licence may be of the first or second class, in accordance with Article 10 of the Service Regulations annexed to the London Convention.

Art. 62.—The licence can be obtained by the passing of a previous theoretical and practical examination held by the Director-General of the Electricity Department of the Ministry of Marine, and in accordance with the programme annexed to these Regulations. This examination will take place after the requirements detailed in the following Article have been duly fulfilled.

Art. 63.—In order to qualify as wireless operator of the first and second classes the applicant must have (1) a certificate of good health, and especially regarding his sensibility of hearing, and a vaccination certificate. Certificates to this effect must be issued by one of the Health Inspectors of the Navy; (2) the operator's identity papers; (3) the applicant's card of enrolment; and (4) his certificate of nationality.

When the applicant is in possession of the above papers he must send his application to the Ministry of Marine, in accordance with the schedule annexed to these Regulations, and must present himself before the Board of Entry of the Ministry, together with the papers referred to.

Art. 64.—Those applicants who have been satisfactorily passed by the wireless schools of the Ministry of Marine will receive at the termination of their studies their certificates as wireless operators.

These operators, as well as those who may have obtained their diploma after passing the examination referred to in Article 51 of these Regulations, must have their qualification revised or ratified before taking up their duties as operators if six months have elapsed without their having practised their profession.

Art. 65.—When the requirements spoken of in Articles 62, 63 and 64 have been fulfilled, the licences will be granted to the applicants, in accordance with the schedule attached to these Regulations. The

applicant—in order to establish the rights conferred by said licences—must affix a stamp of the value of 50 pesos (national currency).

Divers Rules to be Followed by Wireless Stations Open to Public Service and Belonging to Ministries other than the Marine and Home Ministries.

Art. 66.—Where the Ministry having control on the zone where the wireless installation is to be erected has given his consent, all the rulings of said Ministry, or any other of its decisions regarding the stations directly dependent on the said installation, must be obeyed unquestionably.

Art. 67.—Foreign warships will be presented upon their arrival in port with a copy of the ruling Regulations as to wireless service in the country, along with a copy of these Regulations.

Wireless Conventions to be Concluded with Neighbouring Countries.

Art. 68.—In general it shall be the duty of the Minister of the Interior to negotiate the bases of agreements in course of conclusion with neighbouring countries, and he will communicate with the Minister of Marine the results arrived at in the course of such negotiations, so that the latter may give effect to any such conventions in so far as they affect his department. The Minister of Marine shall have the right of being consulted in the negotiation of the bases for such conventions so far as they may directly affect the stations under his jurisdiction, in order to obviate any troubles that may otherwise arise in the administration of the zones which he controls.

C TEMPORARY MEASURES.

On May 6th, 1915, the President of the Republic issued a modifying Decree which reads as follows :—

" Whereas the state of war in Europe has created a special situation in this country which makes it extraordinarily difficult for national steamship companies to procure radiotelegraphic apparatus and other material for the strict fulfilment of what is set forth in Article 7 of Law No. 9127 and Article 43 of the Radiotelegraphic Service Regulations,

" The President of the Argentine Republic Decrees that

" An extension of the time limit of one year as from May 1st will be granted to national steamship companies in which to comply with the stipulations set forth in Law 9127 and Article 43 of the Radiotelegraphic Service Regulations."

And the following was also enacted by him :

Explanatory Decree.

1. Any ship provided, on the date of the Decree, with a radiotelegraphic station of shorter range than that given as obligatory according to Law 9127 will continue to use its present station subject to the restrictions imposed by previous resolutions.

2. Ships which had no station, on the date of the Decree, shall be under no obligation to make an installation until the extension of time granted shall have lapsed.

3. All ships now having a station of less range than that specified in Law 9127, and those having no station at all, must fulfil the conditions of said law before May 1st, 1916.

4. All ships which in the interval fulfil the conditions of Law 9127 and Article 43 of the Radiotelegraphic Service Regulations will be granted their respective licences in a definitive form.

AUSTRALIA

A—Wireless Telegraph Act, 1905 (No. 8), as amended by No. 33 of 1915.

B—Wireless Telegraph Regulations, 1916.

C—Form of Licence.

D—Navigation Act, 1912 (Sec. 231).

THE Department of the Navy controls commercial wireless telegraphy in the Commonwealth. The first Act was passed in 1905, and is as follows :—

No. 8 of 1905.

(As amended by the Wireless Telegraphy Act, No. 33 of 1915.)

A 1. *Short Title.*—This Act may be cited as the Wireless Telegraphy Act, 1905.

2. *Interpretation.*—In this Act—

"Australia" includes the territorial waters of the Commonwealth and any territory of the Commonwealth;

"Wireless Telegraphy" includes all systems of transmitting and receiving telegraphic messages by means of electricity without a continuous metallic connection between the transmitter and the receiver.

3. *Exemption of Ships of War.*—This Act shall not apply to ships belonging to the King's Navy.

4. *Exclusive Privileges.*—The Minister for the time being administering the Act shall have the exclusive privilege of establishing, erecting, maintaining, and using stations and appliances for the purpose of—

(*a*) transmitting messages by wireless telegraphy within Australia, and receiving messages so transmitted, and

(*b*) transmitting messages by wireless telegraphy from Australia to any place or ship outside Australia, and

(*c*) receiving in Australia messages transmitted by wireless telegraphy from any place or ship outside Australia.

5. *Licences.*—Licences to establish, erect, maintain, or use stations and appliances for the purpose of transmitting or receiving messages by means of wireless telegraphy may be granted by the Minister for the time being administering the Act for such terms and on such conditions and on payment of such fees as are prescribed.

6. *Penalty for Breach of Act.*—(1) Except as authorised by or under this Act, no person shall—

(*a*) establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy; or

(*b*) transmit or receive messages by wireless telegraphy.

Penalty: Five hundred pounds, or imprisonment with or without hard labour for a term not exceeding Five years.

Ships Fitted with Apparatus for Wireless Telegraphy.—(2) Sub-section (1) of this section shall not, except as prescribed, extend to appliances maintained on any ship, arriving from any place beyond Australia, for the purpose of enabling messages to be transmitted from or received on that ship by means of wireless telegraphy, but all such appliances shall, while the ship is within Australia—

(*a*) be subject to the control of the Minister for the time being administering the Act; and

(*b*) only be used by his authority or as authorised by the regulations.

Penalty: Five hundred pounds.

7. *Forfeiture of Appliances Unlawfully Erected.*—All appliances erected, maintained, or used in contravention of this Act or the regulations, for the purpose of transmitting or receiving messages by means of wireless telegraphy, shall be forfeited to the King for the use of the Commonwealth.

8. *Search Warrants for Appliances Unlawfully Erected.*—(1) If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that any appliance is established, erected, maintained, or used in contravention of this Act or the regulations, for the purpose of transmitting or receiving messages by means of wireless telegraphy, he may grant a search warrant to any person.

(2) A search warrant under this section shall authorise the person to whom it is addressed to break and enter any place or ship, where the appliance is or is supposed to be, either by day or by night, and to seize all appliances which appear to him to be used or intended to be used for transmitting or receiving messages by means of wireless telegraphy.

9. *Proceedings in Respect of Offences.*—(1) Proceedings for any offence against this Act may be instituted in any Court of Summary Jurisdiction, and any person proceeded against under this section may be dealt with summarily or may be committed for trial.

(2) The Court in dealing summarily with any accused person under this section may, if he is found guilty of any offence against this Act, punish him by imprisonment with or without hard labour for any period not exceeding six months, or by a penalty not exceeding Fifty pounds.

10. *Regulations.*—The Governor-General may make regulations, not inconsistent with this Act, prescribing all matters which by this Act are required or permitted to be prescribed or which are necessary or convenient to be prescribed for carrying out or giving effect to this Act.

Regulations affecting Wireless Telegraphy.

B 1. *Short Title.*—These Regulations may be cited as the "Wireless Telegraphy Regulations, 1916."

2. *Definitions.*—In these Regulations, unless the contrary intention appears—

"Australian ship" means a ship registered in Australia;

"British ship" means a British ship other than an Australian ship;

"Foreign ship" means a ship other than an Australian ship or a British ship;

"Harbour" includes any harbour properly so called, whether natural or artificial, or any estuary, navigable river, pier, jetty, or other work in or at which a ship can obtain shelter, or ship or unship goods or passengers;

"Land Station" means a station, not being a ship station, for the transmission and receipt of messages by means of wireless telegraphy.

"Ship Station" means a ship (not permanently moored) having installed thereon appliances for the transmission and receipt of messages by means of wireless telegraphy;

"Territorial Waters" means the territorial waters of the Commonwealth and those of any territory of the Commonwealth, and includes harbours;

"The Act" means the *Wireless Telegraphy Act,* 1905-1915;

"The Minister" means "The Minister of State for the Navy";

"Naval Board" means the Naval Board of Administration appointed under the Naval Defence Act;

"Naval Secretary" means the Secretary to the Naval Board of Administration.

3. *Permits.*—(1) The Naval Board may, at their discretion, grant permission for technical schools and similar institutions to conduct experiments in Radiotelegraphy for the purpose of training students.

(2) The applicant for such permission shall satisfy the Naval Board that the experiments will be conducted only for the purpose of training students, and shall furnish, with his application, a complete list of the material intended to be used, together with the name and credentials of the person who, it is proposed, will give the instruction.

(3) The applicant shall further agree to allow Inspectors attached to the Radiotelegraph Branch of the Department of the Navy free access to the premises in which the experiments are carried out, for the purpose of inspection, as and when required.

(4) The permission shall be granted without charge, but the Naval Board reserve the right to withdraw such permission at any time, and their decision in the matter shall be final.

4. *Licences.*—(1) A licence shall be granted only in respect of a ship station on an Australian ship.

(2) A licence shall be for a period of one year from the date thereof, but may be renewed from time to time.

5. *Fee for Licence.*—The fee for a licence shall be one pound, and shall be paid in advance.

6. *Application for a Licence.*—(1) An application for a licence must be in writing, and must set out the following particulars:—

(*a*) the name of the ship in respect of which the licence is applied for;

(*b*) the port in Australia at which the ship is registered; and

(*c*) the system of wireless telegraphy to be used on the ship.

(2) Before granting the licence the Minister may require the applicant to furnish such additional particulars as he thinks necessary.

7. *Condition as to Syntony, etc.*—Before any licence is granted the applicant must satisfy the Minister that the wireless telegraphy apparatus or appliances to be worked in pursuance of the licence complies with the Regulations for the time being in force governing syntony and wave length.

8. *Licence to be in Triplicate.*—(1) Every licence shall be made out in triplicate, and two parts shall be issued to the licensee and the other retained in the Department of the Navy.

(2) Before the licence is issued to the applicant he shall execute the part of the licence to be retained in the Department.

9. *Renewal of a Licence.*—(1) A licence may be renewed by writing thereon or attaching thereto a memorandum stating the period for which it is renewed.

(2) The memorandum of renewal must be signed by the Minister or by the Naval Secretary.

(3) The renewal may be made at any time within one month before or one month after the expiry of the licence.

(4) The memorandum is to be written on each part of the licence, but in the case of the licensee's parts it shall be in the form of a receipt for the renewal fee signed by the Minister or by the Naval Secretary, which receipt is to be attached by the licensee to his part.

10. *Revocation of Licence.*—The Minister may, by notice in writing, revoke and determine any licence, on the ground of the licensee having failed to comply with any Regulation for the time in force under the *Wireless Telegraphy Act,* 1905-1915, or on any other ground specified in the licence.

11. *Powers of Inspection.*—The Naval Board or any person authorised in writing by the Naval Board may at all reasonable times enter upon any ship station on which wireless telegraphy appliances are installed, or are in course of being installed, in pursuance of a licence, and may inspect such appliances and the working and user thereof.

12. *Communications between Ship and Land Stations.*—When communications are made by means of wireless telegraphy between a ship (whether British, foreign, or Australian) in territorial waters and a wireless telegraph station on land, the rules in force for the working of wireless telegraphy at that station shall be observed.

13. *Application of the Radiotelegraphic Convention and Regulations.*—The provisions of the Radiotelegraphic Convention and the Service Regulations for the time being in force thereunder, so far as such Convention and Regulations are applicable, shall apply to all wireless telegraphy installations available for the transmission or receipt of private messages, whether installed by the Commonwealth or under licence, and whether at land stations or ship stations, and to all messages handled by such installations, and every licensee shall comply therewith.

14. *Appliances to be Worked so as to Avoid Interference with other Appliances.*—(1) The wireless telegraphy appliances on board any ship (whether an Australian ship, a British ship, or a foreign ship) in territorial waters shall be worked in such a way as not to interrupt or interfere with—

(*a*) Naval or Military signalling; or

(*b*) the transmission of messages between other wireless telegraph stations.

(2) In this Regulation Naval or Military signalling includes signalling or communicating, by means of any system of wireless telegraphy, by the King's Imperial or Dominion Naval or Military Forces.

15. *Appliances not to be worked while Ship Moored to any Wharf or Pier.*—Except by permission of the Naval Board, the wireless telegraphy appliances on board any Australian ship, British ship, or foreign ship (other than a ship of war) shall not be worked or used while the ship is moored to any wharf or pier in Australia or any territory of the Commonwealth.

16. *Application of Defence Regulations to Foreign Ships of War in Harbours.*—The use of wireless telegraphy appliances, on board any foreign ship of war while in any harbour in Australia or any territory of the Commonwealth, shall be subject to such rules (whether prohibitive or regulative) as the Governor-General may think fit to make.

17. *Powers of Governor-General in Emergencies.*—If at any time an emergency has arisen in which it is expedient that the Commonwealth Government should have control over the transmission of all messages by wireless telegraphy, the Governor-General may by notice in the *Gazette* prohibit for such period as he thinks necessary the use of wireless telegraphy on board foreign ships in territorial waters.

18. *Control of Communications and Appliances in Emergencies.*—(1) In case of emergency, the Naval Board or any officer in command of any ship of war of His Majesty's Navy (whether Imperial or Dominion), or any officer in command of any part of the Defence Force, may—

(*a*) take possession of any wireless telegraphy appliances installed on any ship in pursuance of a licence, and use such appliances for the King's service; or

(*b*) place any person in control of any such appliances; or

(*c*) direct the licensee or person in charge of such appliances to submit to him all or any messages tendered for transmission or received by means of such appliances; or

(*d*) stop or delay or direct the licensee or person in charge of such appliances to stop or delay the transmission or delivery of any such messages or to deliver them to him; or

(*e*) direct the licensee or person in charge of such appliances to comply with all such directions as he thinks fit to give with reference to the transmission or receipt of messages by means of such appliances.

(2) Every licensee and every person in charge of any wireless telegraphy appliances installed in pursuance of a licence shall comply with this Regulation, and all directions issued in pursuance thereof.

(3) Reasonable compensation shall be payable to the licensee for any damage to the appliances arising in consequence of the exercise of the powers conferred by this Regulation.

(4) The Minister may, notwithstanding anything contained in a licence issued to a licensee under the Wireless Telegraphy Regulations, 1916, by order published in the *Gazette*, prohibit for such time as he directs any licensee from communicating with any radiotelegraph station licensed by, or belonging to, or in any country which is at war with His Majesty the King or the possessions thereof.

(5) Any order under sub-regulation (4) of this Regulation may prohibit all communications whatever or may prohibit communications to particular stations or under special circumstances.

19. *Operators' Proficiency Certificates.*—(1) Every ship station in respect of which a licence is issued must be operated by a person or persons holding a certificate of competency or certificates of competency issued by the Naval Board after examination, or by the Postmaster-General of the United Kingdom, or by the proper authority in any part of the British Empire.

(2) Certificates of competency shall only be issued to natural-born British subjects, and shall be of two classes, namely:—

(*a*) 1st class—issued to persons over 18 years of age capable of receiving and transmitting by sound at a speed which must not be less than 20 words per minute; and

(*b*) 2nd class—issued to persons over 18 years of age capable of receiving and transmitting by sound at a speed which must not be less than 12 words per minute.

(3) A fee of ten shillings shall be paid by the candidate on each occasion on which such candidate is examined. A certificate of competency may be issued at a charge of five shillings to each candidate who satisfactorily passes the prescribed examination, and in the event of a certificate being lost a fee of ten shillings shall be paid for the first copy of such certificate, one pound for the second copy, and two pounds for any subsequent copies. In case of failure a candidate shall not be re-examined in any system or under any circumstances until after the lapse of three months.

20. *Use of Wireless Telegraphy for Military Purposes.*—These Regulations shall not prevent the use, without licence, by the military authorities of wireless telegraphy for military purposes. Provided that each wireless telegraphy installation (other than a mere temporary installation) to be used shall be authorised in writing by the Naval Board.

21. *Charges.*—The total charges for messages transmitted and received for any duly authorised Wireless Station within the Commonwealth or licensed under the *Wireless Telegraphy Act*, 1905-1915, shall include:—

(*a*) the coast charge which belongs to the coast station;

(*b*) the ship charge which belongs to the ship station;

(*c*) the charge for transmission over the lines of the telegraph system (where necessary); and

(*d*) delivery charges (where necessary).

22. *Rates.*—The rates for messages transmitted to or received from ship stations shall be as follows :—

(1) For ordinary messages—

(*a*) Coast station transmitting or receiving charge—

(i) Radiotelegrams to or from ships licensed in Australia or New Zealand, 3d. per word;

(ii) Radiotelegrams to or from other ships, 6d. per word.

(*b*) Ship station transmitting or receiving charge—

(i) Radiotelegrams to or from ships licensed in Australia or New Zealand, 2d. per word;

(ii) Radiotelegrams to or from other ships, not exceeding 4d. per word.

(*c*) Land line charge, 1d. per word.

(2) For press messages—

(*a*) Coast station transmitting or receiving charge—
1½d. per word.

(*b*) Ship station transmitting or receiving charge—
Not exceeding 4d. per word, as determined by the ship authorities concerned;

(*c*) Land line charge, ⅓d. per word, odd fractions of one penny to be reckoned as one penny.

(3) For messages to or from ships of the British or Australian Navies—

(*a*) For official messages—

(i) There shall be no coast station charge.

(ii) There shall be no ship station charge.

(iii) Land line charge, 1d. per word.

(*b*) For private messages—
The rates and conditions shown in sub-Regulation (1) of this Regulation shall apply.

(4) For messages consisting of reports to Lloyd's agents concerning marine casualties and overdue vessels :—

(*a*) Coast station charge, 6d. per word.

(*b*) Land line charge, 1d. per word.
The charges for these messages shall be collected from the addressee.

(5) The charge for relaying radiotelegrams, irrespective of the number of coast stations concerned in the relaying, shall be :—

(*a*) When the ships of origin and of destination are both licensed in Australia or New Zealand, 4d. per word;

(*b*) When only one of the ships concerned or when neither of the ships concerned is licensed in Australia or New Zealand, 7d. per word.

23. (1) The rates for messages exchanged between stations established on the Australian mainland or in Tasmania and stations established on islands within the Commonwealth Administration or between any stations established on such islands, except Flinders Island and King Island, shall be—

(*a*) For ordinary messages one penny per word per radio station involved, plus ordinary land line charges for telegrams within the Commonwealth.

(*b*) For press messages—

	s.	*d.*	
Not exceeding 25 words ...	1	3	per station involved.
Exceeding 25, but not exceeding 50	2	6	,, ,, ,,
Exceeding 50, but not exceeding 100	5	0	,, ,, ,,
Every additional 50 words or portion of 50 words ...	2	6	,, ,, ,,

plus ordinary land line charges for press telegrams within the Commonwealth.

(2) The rates for messages exchanged between stations established on the Australian mainland or in Tasmania and stations established on King and Flinders Islands shall be—

(*a*) For ordinary messages one halfpenny per word per radio station involved, with a minimum of one shilling per message, plus ordinary land line charges for telegrams within the Commonwealth;

(*b*) For press messages—

	s.	*d.*	
Not exceeding 25 words ...	0	7½	per station involved.
Exceeding 25 but not exceeding 50 words	1	3	,, ,, ,,
Exceeding 50 but not exceeding 100 words	2	6	,, ,, ,,
Every additional 50 words or portion of 50 words ...	1	3	,, ,, ,,

plus ordinary land line charges for press telegrams within the Commonwealth.

(3) For messages exchanged between stations established on the Australian mainland or in Tasmania at times when the local telegraph offices are closed, the rates shall be 3d. per word plus the ordinary land line charges for telegrams within the Commonwealth, for such land line handling as is involved.

(4) For press messages exchanged between stations established on the Australian mainland or in Tasmania at times when the local telegraph offices are closed, the rates shall be 1d. per word plus the ordinary land line charges for press telegrams within the Commonwealth, for such land line handling as is involved.

(5) The rates for the radiotelegraphic transmission of deferred and week-end telegrams shall be one-half and one-quarter of the ordinary rates respectively.

(6) Delivery charges, if any, shall in all cases be paid by the addressee.

24. (1) Radiotelegrams conveying Christmas or New Year greetings may be lodged at any telegraph office in the Commonwealth for transmission to New Zealand or to vessels registered in Australia or New Zealand. In addition to the address and signature, such radiotelegrams may contain a text consisting of any one of the following phrases:—

(*a*) "Christmas greetings."
(*b*) "New Year greetings."
(*c*) "Compliments of the season."

(2) The total charge for such radiotelegrams shall be:—

(*a*) For those addressed to New Zealand, 4s.

(*b*) For those addressed to vessels registered in Australia or New Zealand, 3s.

(3) Radiotelegrams containing the text "Christmas greetings" must be lodged on or before 23rd December, and those containing the text "New Year's greetings" or "Compliments of the season" must be lodged on or before 28th December.

25. The total charge for messages transmitted to or from ships shall be paid by the sender.

26. *Press Radiotelegrams for Publication on Ships.*—(1) Press radiotelegrams for publication on ships shall be addresed to the commander of a ship, or to a newspaper published on board a ship, and shall bear in the address the words "for publication," which words shall be charged for at press rates.

(2) The information contained in such press radiotelegrams must either be published in a ship's newspaper or posted on a ship's public notice board.

(3) Press radiotelegrams shall, subject to this Regulation, comply with the provisions of Articles 65 and 66 of the detailed Regulations attached to the International Telegraph Convention.

27. *Refunds.*—The full charge for a radiotelegram will be refunded when such radiotelegram is rendered useless through a fault of the telegraph service, and the full charge, less land-line charges, will be refunded when a radiotelegram cannot be delivered on account of the ship of destination having passed out of range.

28. *Transmission of Shipping Intelligence by Telephone.*—Information received at a coast station from vessels at sea, indicating the noon or midnight position, will be communicated by telephone to the owners or agents of such vessels on payment of one shilling per communication.

29. *Ocean Forecasts and Weather Reports.*—Ocean forecasts sent by the Commonwealth Meteorologist will be transmitted from radiotelegraph stations owned, operated, and maintained by or on behalf of the Minister to vessels at sea, and weather reports received at such radiotelegraph stations from vessels at sea, and addressed to the Commonwealth Meteorologist, will be transmitted, on payment of the following charges:—

For each communication not exceeding 20 words, 2s.; for each additional word, 1d.; plus one penny per word land line charge.

30. *Repeal.*—All Regulations previous made under the *Wireless Telegraphy Act* 1905-1915, and in force at the commencement of these Regulations, are hereby repealed save as to any right, privilege, or obligation acquired, accrued, or incurred thereunder.

C The form of licence set out in the schedule to the above regulations is similar to that employed by the British Post Office.

Navigation Act

D THE Commonwealth Parliament have passed a new Navigation Act which contains a clause making it compulsory for ships trading in Australian waters to be

equipped with apparatus for wireless telegraphy. This matter is dealt with in Section 231 of the Act, and the text of the section given below is as under:—

EXTRACT FROM NEW NAVIGATION ACT, 1912.

DIVISION VI.—SIGNALS OF DISTRESS.

231. (1) Except as prescribed, every foreign-going ship, Australian trade ship, or ship engaged in the coasting trade, carrying fifty or more persons, including passengers and crew, shall before going to sea from any port in Australia be equipped with an efficient apparatus for wireless communication in good working order in charge of one or more persons holding prescribed certificates of skill in the use of such apparatus.

(2) For the purposes of this section apparatus for wireless communication shall not be deemed to be efficient unless:—

(*a*) It is capable of transmitting and receiving messages over a distance of at least one hundred miles, day and night.

(*b*) The person controlling the operator undertakes in writing to the Minister to exchange, and does, in fact, exchange, as far as may be physically practicable (of which the master shall be the judge) messages with shore or ship stations using similar or other systems of wireless communication; and

(*c*) There is provided, in connection with the apparatus, and ready for use whenever from any cause the ordinary supply of electrical power is not available, a battery of accumulators of such capacity as to insure for a period of at least six hours communication of the efficiency prescribed in paragraph (*a*) of this sub-section.

(3) The equipment shall, if so prescribed, include a silent chamber for the receipt of messages.

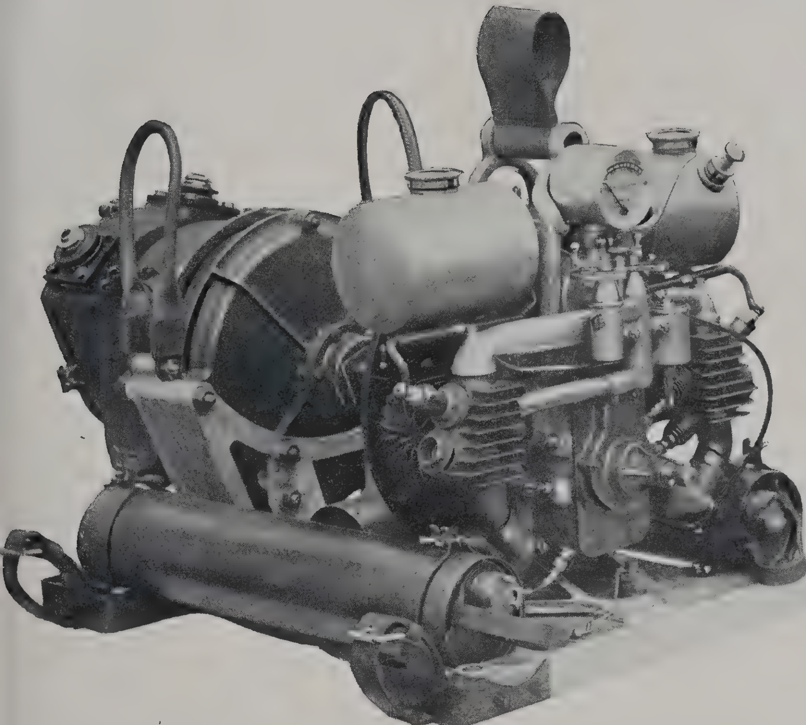
(4) The master of a ship required by this section or the regulations to be equipped with wireless telegraphy apparatus shall not take her to sea, and the owner of a ship required to be so equipped shall not permit her to go to sea, unless the requirements of this section have been complied with.

PENALTY: One Thousand Pounds.

(5) The regulations may prescribe the times and hours during which an operator shall be in attendance on the apparatus, ready to receive or transmit messages.

(6) Except as otherwise prescribed, the provisions of this section shall not apply to ships plying exclusively between ports in Australia less than two hundred miles apart.

(7) The Governor-General may make regulations in accordance with the provisions of any International Convention to which the United Kingdom is a party relating to the use of Wireless Telegraphy on ships, and such regulations may be in addition to, or in substitution either wholly or in part for the provisions of this section.



MARCONI ENGINE AND DYNAMO FOR HANDCART SET, DEVELOPING $\frac{1}{2}$ KILOWATT.

[*To face page* 144.

AUSTRIA

A—Decree of Ministry of Commerce, 7th January, 1910.
B—Document of Concession.
C—Decree of Ministry of Commerce, 8th November, 1910.
D—Special Regulation, Ministry of Commerce, 1st March, 1912.
E—Regulations (Ship Stations), 1st April, 1912.
F—Temporary Service Regulations—Operators.

A THE following Decree of the Ministry of Commerce, dated 7th January, 1910, is concerned with wireless telegraph stations in the Austrian Empire, on board Austrian ships, and on ships of foreign nationality in Austrian territorial waters :—

(1) In accordance with a High Decree of Parliament of January 16th, 1847, and the Decree of the Ministry of Commerce, dated April 28th, 1905, the erection and working of Wireless Telegraph stations in the Austrian Empire and on Austrian ships is a State concession, to acquire which a written application (liable to Stamp Duty), containing a description of the station and a diagram of connections, must be submitted.

(2) The choice of system, apparatus, and fixtures, as well as the establishment of coast and land rates within the limits of the Wireless Telegraph agreement of 1909, and the supplemental regulations are the prerogative of the Ministry of Commerce.

(3) The general regulations for Wireless Telegraph stations on board ships are shown below.

(4) Wireless Telegraph stations on board ships must fulfil the following conditions :—

(*a*) They must be of equal technical efficiency to systems other than that adopted in the stations, and they must be able to inter-communicate with other systems.

(*b*) The system adopted must be one of "syntonisation."

(*c*) The speed of transmission and reception must not, under normal circumstances, be less than twelve words (each of five letters) per minute.

(*d*) The power possessed by the apparatus must not exceed, in normal conditions, 1 kilowatt. A greater power can be used when the ship is under an obligation to exchange messages at a longer distance than 300 kilometres from the nearest coast station, or when the transmission can only be effected by means of a higher power than specified.

(5) The working of Wireless Telegraph stations on board foreign ships in Austrian territorial waters is dependent upon the previous grant of a State concession. This regulation does not apply to war-ships or ships in distress. If a foreign vessel employs its Wireless Telegraph station without authorisation, the State authorities may take steps to prevent the working of the station in Austrian territorial waters.

Document of Concession.

B

THE Ministry of Commerce hereby grants to .... the concession for the installation and working of a wireless telegraph ship station on board the s.s. .... and reserves to itself the right to cancel same at any time. The concession is granted on the following conditions :—

(1) The Wireless Telegraph station must be erected according to the description in the application and according to the diagram of connections.

Supplemental changes in the technical installation which would have an effect upon the transmitting and receiving speed of the station cannot be undertaken without the consent of the Ministry of Commerce.

(2) The concessionnaire must pay an annual recognition fee of 20 Kronen for the station.

(3) The Telegraph Directorate is entitled to empower their officials to examine the station and to control the working of the same.

Opportunity must be given to officials of the Austrian Navy, on their request, to make themselves acquainted with the working of the station apparatus.

Collusion in order to keep back details of the condition of the station from the official authorities is inadmissible.

(4) The Telegraph Directorate reserves to itself the right of using the station at any time, completely and absolutely, or for a definite kind of correspondence, and this they may do without giving their reasons, or without the concessionnaire being able to claim any indemnity.

(5) In case of war and mobilisation the station must be closed. The commander of the ship must superintend the closing and make himself responsible for it.

The control over the supervision of this measure is confined to the military authorities.

(6) Only Austrian subjects can be employed as telegraph operators, and they must be able to show a testimonial to the effect that they have successfully passed the special examination of the Telegraph Directorate.

Wireless telegraph operators on board ship must be provided with a sea service book, they must be enrolled in the muster, and must be subject to the ship's discipline.

In case of the cancelling of the above-mentioned testimonial by the State Telegraph Directorate, a telegraph operator must be dismissed immediately.

Every change of operator must without delay be notified to the marine authorities in Trieste.

(7) The concessionnaire must allow to third persons the services of the station on payment by them of the normal charges.

(8) The station charge amounts to . . . a word. The lowest telegram amounts to . . . Kronen. The charge belongs to the underwriter.

(9) The station must exchange news with all coast stations, and with all other ship stations without prejudice as to the system of wireless telegraphy used by these stations.

(10) As regards the working of the station and the scale of the tariff, the regulations of the International Radio Telegraph Convention and its supplemental regulations must be observed, in the same manner as all measures published by the Telegraph Directorate.

The call signal of the station is established as . . . .

C THE following is a copy of the Decree of the Minister of Commerce of November 8th, 1910, concerning the installation of wireless stations on passenger ships engaged in the carrying service abroad :—

Austrian vessels of the merchant service making voyages from Austrian ports and carrying passengers beyond Gibraltar or Aden must be fitted with wireless telegraph apparatus.

With regard to the fitting, working, and staff of such wireless stations, the conditions of the Decree of the Ministry of Commerce dated January 7th, 1910, must be complied with. Such stations must be capable of exchanging telegrams at a distance of 100 nautical miles, and above all must be of use, at the request of the Captain, for rescue purposes and for the safety of the vessel by communication with coast stations or with the stations of other ships without distinction of system.

The Royal Imperial Masters of Ports as well as Consuls are authorised to forbid the carrying of passengers on any ships passing beyond Gibraltar and (or) Aden not so fitted.

This decree will come into force one year after notice of same has been published.

D THE following Regulation of the Ministry of Commerce, dated March 1st, 1912, concerns the erection of a wireless telegraphy inspectorate in Trieste, and the erection and regulation of wireless telegraphy offices on Austrian vessels.

(1) In accordance with the High Decree of 15th February, 1912, a Royal Wireless Telegraphy Inspectorate has been created, which is immediately subordinate to the Ministry of Commerce. On and after April, 1912, this department shall control the Wireless Telegraph offices on board Austrian ships, private Wireless Telegraph offices on Austrian ships and foreign ships in Austrian territorial waters.

REGULATIONS.

E THE following normal Regulations governing the installation and working of wireless telegraph offices on board Austrian ships came into force on April 1st, 1912 :—

(1) Wireless Telegraph offices on board ships under the State direction shall carry the sign "Kk Bordtelegraphamt" (Royal Telegraphy Office on Board Ship), together with the name of the vessel.

(2) The owner of a vessel who requires a Wireless Telegraph office must apply to the Ministry of Commerce, and must give the following particulars :—

(*a*) The name of the ship and the time and date when the installation is required to be erected.

(*b*) The routes on which the ship will be principally engaged.

(*c*) The accommodation for first and second-class passengers on board.

(3) The Ministry of Commerce must, within a period of two months, inform any applicant for a Wireless Telegraph installation on board ship whether such an installation will be granted, and, if so, upon what terms.

Provided the vessel on which it is proposed to instal a Wireless Telegraph office comes within the scope of the Decree of the Ministry of Commerce, dated November, 1910 (concerning the equipment for Wireless Telegraphy of long-voyage passenger ships) the Ministry of Commerce must grant any application made in accordance with these regulations.

In cases where the Ministry declines to grant an installation, it is not called upon to state any reasons for its refusal. A written agreement is in all cases drawn up between the State Department and the owner of the vessel when an installation is granted.

In the event of any change in the regulations, a new agreement must be made.

(4) The Wireless Telegraph office shall be installed as near as possible to the date required by the shipowner, provided the application sent has duly satisfied the conditions laid down in Regulation 2. The period during which the installation is granted is usually six months.

The State department shall bear the entire cost of the fitting and furnishing of the Wireless Telegraph office, which is to remain the property of the State. The department shall undertake to maintain the office in a state of efficiency and to supervise the working of the installation through its own servants.

(5) The shipowner shall be responsible for the cost of all arrangements on board, services of the ship's *personnel,* materials and plant necessary for the proper installation and working of the Wireless Telegraph office, as well as the necessary electric power.

The shipowner's obligations with regard to these arrangements are set forth in detail in the written agreement referred to in Regulation 3.

The shipowner shall be required to provide adequate facilities for the telegraphists on board, to enable them to carry out their duties in an efficient manner; and the telegraphists must be made acquainted with the course and speed of the ship, soundings, and distances from foreign stations, as well as meteorological data.

6. The shipowner must pay the salaries due to the telegraphists for each voyage, which amounts thus paid will be refunded by the State, who will inform the owner, before the departure of the vessel, the amount of salary due to the telegraphists and the dates when the salaries become due.

The owner of the ship must make suitable provision for the safety of the telegraphists on board.

The owner must, at his own cost, carry out the following duties :—

(*a*) Carry telegraphists of the Royal Austrian Navy between Pola and Trieste when ordered to transfer them to or from the Wireless Telegraph Inspectorate at Trieste.

(*b*) Transfer the ship's telegraphists between the port and the ship which is being equipped with a Wireless Telegraph office, or between two ships, and provide for the maintenance of the telegraphists during the transfer.

(*c*) First-class travelling expenses and maintenance of the chief officials of the Royal Telegraph Department shall be provided when the officers are proceeding to take up their duties. Second-class travelling expenses shall be provided for officers of lower rank.

(7) The shipowner must contribute to the State Department an annual sum for the cost of the Wireless Telegraph office on board. In the case of ships which come under the decree of the Ministry of Commerce dated November, 1910, the amount which the shipowner must contribute is from Kr. 2,200 to 2,500, the amount depending upon whether the apparatus is of the first or second-class type. The Ministry of Commerce will decide under which class the apparatus comes. The annual amount is payable in advance, in instalments, which become due on the first day of the months January, April, July, and October. The liability of the owner of the vessel becomes due on the date when the Wireless Telegraph office on board commences operations, and ceases on the date of the closing of the office; but in any case not before the expiration of the term of notice.

If the ship should be lost, the obligation to contribute ceases on the date of the loss, and when this is not known, the obligation is dated from the last date on which the ship was heard.

When a vessel has received through its Wireless Telegraph office distress messages from other ships, and has thus saved or helped to save another ship, the owner must pay to the State Department 3 per cent. of the net sum received by him for salvage.

(8) Service messages to and from the owner of the ship are dealt with at ordinary rates; "shipowner telegrams" which are wireless telegrams transmitted by the captain of the ship to the owner, or to the managing officials or agents, and which deal with the crew, passengers, cargo condition, voyage, conduct, or damage of the ship, are not transmitted in the interests of a third person.

"Ship Service Telegrams" are wireless telegrams exchanged by the captains of ships under the same ownership. Both classes of telegrams must be composed by the senders, and code words must be used as far as possible. A copy of the code must be deposited on board ships that have to transmit shipowner and ship service telegrams, and likewise in the office of the department. Such telegrams must be written by the sender on a form having a detachable receipt coupon provided for the purpose. They are only transmitted when the receipt coupon has been impressed with the ship's stamp, and this stamp must agree with the stamp which is deposited by the commander of the vessel in the wireless telegraph office on board.

(9) The coast and land charges for shipowner telegrams are deferred and are fixed on the basis of the receipt coupon in the wireless office on board. These charges must be checked immediately after the arrival of the ship in her own port against the amount of the receipt in the wireless telegraph office on board.

The charges for private telegrams may be collected in cash by the officer in charge of the wireless telegraph office, at the time of the despatch of the telegram, or they may be placed to credit.

(10) Telegraph operators on board are subject to the general discipline of the ship, and to the instructions of the captain or his representatives. They must not, however, be called upon to participate in any of the ordinary business of the ship.

Free access to the premises of the telegraph office is allowed to the captain or to his representatives. Other members of the crew may have access to these premises only for the purpose of executing the duties mentioned in Regulation 5.

A member of the crew must be sufficiently competent to take the place of the operator in case of necessity, and before the beginning of the voyage the person so appointed must be sworn to secrecy in the usual way.

(11) The State shall provide a Wireless Telegraph office on board ship when it deems it necessary for a definite or indefinite period, and in this case the owner has no claim to indemnity.

In the case of mobilisation or war the embargo on the Wireless Telegraph office of a ship can be ordered by the Royal Austrian Navy or by a Royal Austrian Consulate.

The captain of a ship is responsible for the closing of a telegraph office when such an order proceeds from the authorities mentioned.

(12) The State may at any time create a Wireless Telegraph office on a ship not limited to the decree referred to in Regulation 3. The owner of the ship must receive not less than six months' notice of the intention to create such an office; but, where circumstances warrant it, this period of notice shall not be observed.

The owner must give six months' notice in writing of his intention to terminate the agreement referred to in Regulation 3, and in the case of the sale of the ship three months' notice.

After the expiration of the notice the Wireless Telegraph office will be dismantled (except in the case of the ship sold abroad), but the dismantling shall take place only when the ship is in an Austrian port.

In the event of the dismantling of the office taking place in a port other than that of Trieste, the shipowner must pay for the technical dismantling and material belonging to the State, and he must despatch the apparatus to Trieste at his own cost, and pay the fares of the telegraph operators to the last-named port.

Temporary Service Regulations for Wireless Telegraphists.

A.—General.

F 1. In the Wireless Telegraph service of the Government Post and Telegraph Organisation, and, outside the Royal Naval Reserve, State employees under the title of "Funkentelegraphisten" (wireless telegraphists) will be employed.

The appointment of wireless operators will only take place in case of a lack of Royal Naval Reserves.

The conditions of service of wireless operators is subject to the following regulations, which, however, do not in any way affect discipline on board ship either of Captains, Port Officials, or Consuls.

B.—Appointment.

The conditions for the appointment of wireless operators are as under :—

1. Proof of Austrian citizenship.
2. Freedom from any conviction in a criminal court.
3. Age limit, between 18 and 40 years.
4. Proof of bodily fitness and general capability for the service.
5. Proofs of the necessary knowledge of languages for the special conditions of service.
6. Proof of capability to obtain a ship's telegraphist's certificate in case one year has expired since the issue of the certificate held by the applicant or since the last practical work done by him. The applicant has to prove that he has sufficient practice to enable him to carry on the service in an appropriate manner.
7. Applicants under age must present proof of permission to enter the service from parents or those responsible for them.

The following are excluded from appointment :—

1. Those who, through conviction in a criminal court have lost the right to enter the State service providing they have not regained same.
2. Those who have been bankrupts or who are trustees or guardians.
3. Those who have been employed by the State, and through some fault of their own have been dismissed therefrom.

Should a person who according to these regulations is excluded from appointment by any chance be appointed without the approval of the Minister of Commerce, he shall be considered as no longer belonging to the Service from the time that his undesirability for the Service is proved, and at once be dismissed therefrom without further ado.

4. Appointment is made by the Wireless Telegraph Department in Trieste by means of Service contract and either :—

   (*a*) by notice, or

   (*b*) for a certain voyage.

For appointment for a voyage only temporary use of the services of an operator as far as can be foreseen would be made, and State officials do not undertake any responsibility for the disadvantages which may be caused to an operator through the prolongation of the duration of a voyage of any ship on which he may be engaged.

When appointments are being considered, those persons who have requested the Inspectors' Department of the Service to put them in special or certain positions will first be taken into account.

The Service contract will be made in duplicate, one copy being handed to the employee against receipt for same, the other one being kept by the officials of the Department.

5. Wireless operators will be sworn in by the officials of the Wireless Department. The form of oath will be the one prescribed for other State officials.

C.—Rights and Duties.

6. For appointments subject to notice salary will be paid monthly. The monthly salary is due from the first to the last day of service inclusive.

Whether the salary commences or ends during the course of a calendar month, only the aliquot part will be paid, and 30 days will be reckoned as being one month.

7. For appointments for voyages salary will be paid by the day. The daily salary is due from the first to the last day of service inclusive.

In case a telegraphist who was appointed for a voyage should enter upon duty where he is subject to notice, he is entitled to any money outstanding under the conditions of the previous terms of appointment.

8. The payment of salary as mentioned in Par. 6 and 7 will take place on the last day of each month, but should an operator leave the service on a day other than the last of the month, he will be paid when he leaves. During a voyage the payment of salary will be made by the paymaster of the shipowners.

For voyages beyond the Mediterranean and Black Seas only one-half of the salary will be paid during the voyage, the other half being paid by the Wireless Telegraph Dept. at the end of the voyage.

9. Beside the regulation pay as per Par. 6 and 7, the wireless operator has a right to the following:—

(1) The benefits conferred by the Regulations of the Board of Trade of March 1st, 1912, R.G.Bl. No. 43 from the shipowners, and especially for sustenance and attention on board.

(2) A share in the profits of telegrams transmitted as per the special rules.

Telegraphists appointed subject to notice are further allowed: —

(*a*) For the period when not on board they receive an extra allowance of kronen 2 per day.

(*b*) For proofs of a mastery of a foreign language or languages, kronen 5 per month for each foreign language.

10. Operators may wear uniform whether on or off duty, but the wearing of any other uniform than that described in Supplement 5 is not permitted. Operators must use or allow to be used the wireless installations under their care *only* for the benefit of the State, and are moreover to continually bear in mind the safety of the ship.

Before going aboard, wireless operators must see that they have a sea Service Book in their possession.

E.—Cancellation of the Service Contract.

19. The Service Contract of operators appointed on notice may be cancelled:—

(1) By a six months' notice from either party.

(2) By the obligation to enter the military service as prescribed by the law for the duration of the said military service.

(3) By dismissal.

20. The Service Contract of operators appointed for voyages may be cancelled :—

(1) After the expiry of three days from the date of return from a voyage.

(2) By dismissal.

21. Except when a telegraphist has been dismissed from the Service, he has the right to a reference covering the period of his service.

F.—Staff Records.

22. At the Inspectors' Office of the Wireless Telegraph Department complete data regarding each wireless operator will be kept. The operator is bound to give any particulars by document or otherwise, and also to report any changes necessary in the said data.

BAHAMAS

AN Act to restrict the use of wireless telegraphy except under certain conditions (1902) :—

1. This Act may be cited for all purposes as "The Wireless Telegraphy Restriction Act, 1902."

2. From and after the passing of this Act it shall be unlawful for any person in these islands to transmit or receive messages across the seas by means of any wireless telegraphy whatsoever (" *or to erect, construct, establish, or maintain any instrument or apparatus for the purpose of transmitting or receiving such messages* "—added by an Act of 1903), unless such person shall have previously received the consent in writing, under the hand of the Colonial Secretary of the Governor in Council, authorising the same.

3. Any person violating the provisions of this Act shall be liable, on summary conviction, to a penalty not exceeding £200, anything in the Magistrates' Act, 1896, to the contrary notwithstanding.

BARBADOS

A.—Wireless Act, 1908.

B.—Wireless Act, 1913.

C.—Executive Rules.

WIRELESS Telegraphy in Barbados is worked under three sets of regulations : (*a*) The Barbados Wireless Act of 1905 ; (*b*) an Amending Act, passed in April, 1913 ; and (*c*) a number of rules made under the latter Act.

As these are quite distinct, we publish their respective texts below :—

Wireless Act, 1905.

A 1. This Act may be cited as the Wireless and Submarine Telegraph Act, 1905.

2. (1) The West India and Panama Telegraph Company shall not lay down or maintain a new telegraph cable nor shall any other company or person lay down or maintain any telegraph cable upon the foreshore and bed of the sea except under and in accordance with an Act of the Legislature.

(2) A person shall not establish any wireless telegraph station, or instal or work any apparatus for wireless telegraphy in any place in this island except under and in accordance with an Act of the Legislature.

(3) If the West India and Panama Telegraph Company lays down or maintains a new telegraph cable or if any other company or person lays down or maintains any telegraph cable upon the foreshore or bed of the sea without the authority of an Act of the Legislature in that behalf, the company or person shall be liable, on conviction before a Police Magistrate, to a penalty not exceeding £100 and shall forthwith remove the telegraph cable, and if the telegraph cable be not removed within one day after such conviction the company or person shall be liable to a penalty not exceeding £50 for each day thereafter during which the company or person shall fail to remove the telegraph cable. Provided, that the Governor-in-Executive Committee may at any time after the expiration of one day from the date of the conviction cause the same to be removed and destroyed.

(4) If any person establishes a wireless telegraph station without the authority of an Act of the Legislature in that behalf, or instals or works any apparatus on any place in this island for wireless telegraphy without such authority in that behalf, he shall be liable, on conviction before a Police Magistrate, to a penalty not exceeding £100, and further be liable to forfeit any apparatus for wireless telegraphy installed or worked without such authority.

(5) If a Police Magistrate is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without legal authority in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place within his jurisdiction without such authority in that behalf, he may grant a search warrant to any police officer named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station or place and to seize any apparatus which appears to him to have been used, or intended to be used, for wireless telegraphy therein.

(6) No proceedings shall be taken under any of the provisions of this section except by order of the Governor.

3. This Act shall continue in force until the 31st day of March, 1907. (*By an amending Act of 1908 this Act continues in force until repealed by the Legislature.*)

WIRELESS ACT, 1913

Passed on the 11th April, 1913.

B **1.** This Act may be cited as the Wireless and Submarine Telegraph (Amendment) Act, 1913.

2. (1) *Making of Rules and Regulations.*—The Governor-in-Executive Committee may from time to time make rules and regulations governing the use of wireless telegraph apparatus on merchant ships, British or foreign, while in the territorial waters of this Colony.

(2) *Ratification.*—Such rules and regulations, when sanctioned by both Houses of the Legislature and assented to by the Governor, shall come immediately into operation and shall have the same force and effect as if the same had been herein expressly enacted.

(3) *Penalties.*—If the master of such ship or any person on board such ship commits a breach of any of these rules and regulations:—

(*a*) the ship shall be subject to a maritime lien in favour of His Majesty the King, his heirs and successors, for a sum of one hundred pounds, and the amount so charged may be sued for and recovered in the Colonial Court of Admiralty;

(*b*) the ship may be detained by force if necessary by the Harbour and Shipping Master or his chief clerk, with the aid of the harbour police, until payment of the lien aforesaid or until arrested under process of the Colonial Court of Admiralty;

(*c*) the master of such ship shall be liable to a penalty not exceeding fifty pounds;

(*d*) the person committing the breach shall be liable to a penalty not exceeding fifty pounds.

3. (1) *Special Orders.*—In any case of urgency which is not provided for in the rules and regulations, the Governor may make any special order, and such order shall come immediately into operation and shall have the same force and effect as if the same had been herein expressly enacted.

(2) *Penalties.*—If the master of such ship or any person on board such ship commits a breach of any special order, the ship shall be subject to the maritime lien imposed by section 2 of this Act for the amount therein mentioned, and may be detained as is therein provided, and the master, and the person committing the breach, shall be liable to a penalty not exceeding fifty pounds.

Executive Rules issued by the Governor.

C 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with (*a*) Naval signalling or (*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbour of the Colony except with the special or general permission of the Colonial Secretary of the Colony.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

BELGIUM

THE following Decree came into force on November 3rd, 1913:—

In virtue of the law of March 6th, 1818, relating to the penalties to be imposed for contraventions of the administrative regulations in the interior, as also to those which might be called into force by the by-laws of provincial and communal authorities, on the suggestion of our Minister of Marine, Posts, and Telegraphs, we do and hereby decree:—

1. On Belgian territory and on Belgian ships every kind of electrical radiating apparatus or installation capable of being used for or interfering with either the transmission or the reception of radio-telegraphic or radio-telephonic signals, as well as every projected removal of or modification to, or in the arrangement of an authorised installation, must be submitted to the Marine Department previous to any steps being taken which may be considered as a commencement of such a project.

The applicant for a licence must indicate the nature of the installation, the object of its exploitation as regards ship stations, the tariff of taxes which it is intended to charge, the details of the apparatus and methods to be employed, the wave length, the hours of working, and generally all information of such a nature as will permit of a complete study of the project; it must further state what measures are proposed in order to prevent disturbance in the service of other stations, either official or authorised.

2. The granting of a licence is subject to the reserve and conditions which are considered necessary in the interest of the public safety and convenience, this also including the safeguard of the public and service correspondence.

3. A new licence becomes necessary:—

(*a*) If the station has not been installed or modified and put into service within the time specified in the licence.

(*b*) If the station has been put into action or exploited in conditions other than those stipulated therein.

4. This regulation applies to all installations which were in existence prior to the Act being put into force, and the owners of such installations must forthwith apply for a licence, as prescribed in Article 1 of this Act, and in the meantime they must suspend the operation of such stations until the granting of a licence.

5. Vessels registered in foreign nations, fitted with wireless telegraph apparatus previous to their entry into Belgian waters, shall not be subjected to the previous dispositions, but they must procure a permit from the Belgian Minister to enable them to operate. Neither do the foregoing dispositions prevent distress signals being sent or received from other ships.

Foreign vessels are required, on entering Belgian waters, to cease all operations which might interfere with radio-telegraphic or radio-telephonic stations in Belgium.

6. On Belgian territory and in Belgian waters, as well as on board Belgian vessels to be found in foreign waters or harbours, the duly sworn delegates of the Government (according to Article 8 of the law of July 10th, 1908) have, at all times of the day or night, free access to the lands, buildings, ships or other craft, where licensed installations are working or for which a regular certificate of authorisation has been granted. The proprietors, exploiters, owners, commanders, directors, managers, chiefs, or employees of any description are bound to facilitate by all means in their power to help such delegates in the carrying out of their duties of examining such stations.

7. Proprietors, exploiters, and owners are responsible under civil law for the fines imposed on their commanders, directors, managers, chiefs, or employees.

8. The Minister of Marine, Posts, and Telegraphs is charged with the execution of the present law.

9. The present law will come into force the day following the date of publication (November 4th, 1913).

BERMUDA

A—The Wireless Telegraph Act, 1903.

B—The Wireless Telegraph Act, 1909.

The Wireless Telegraph Act, 1903.

A FROM and after the passing of this Act it shall not be lawful for any person in these islands to transmit or receive messages across the seas (*by an Act of* 1910 *this was amended by the addition of the words "or between places in these islands"*) by means of any wireless telegraphy, or to instal, erect, construct, establish, or maintain in these islands any instrument, apparatus, or other thing for the purpose of transmitting or receiving such messages, unless such person shall hold a written licence from the Governor authorising the same, and such licence shall be in force and unrevoked; and any person who shall offend against the provisions of this enactment shall be liable, on summary conviction before any two justices, for a first offence to a penalty not exceeding £25, and for a second or subsequent offence to a penalty not exceeding £100.

2. Any licence issued by the Governor under this Act may at any time be revoked by him by a written notice given to the person to whom such licence was issued, or by the publication of such revocation in the *Gazette*, and after such revocation such person shall not be entitled to any privilege or protection by virtue of such licence.

3. Any licence under this Act may be issued subject to such conditions and restrictions as the Governor may from time to time consider desirable in the public interest.

4. If any Justice of the Peace shall be satisfied from the information on oath of any credible person that there is good reason to believe that any of the provisions of the first section of this Act have been or are being violated, he may issue a search warrant to any constable or constables authorising and requiring him or them, with or without assistants, at any hour of the day or night, to enter into, and go through and search, inspect and examine any premises where such violation is suspected to have been or to be committed for the purpose of ascertaining whether such violation has been or is being committed; and if, upon such search, any instrument, apparatus, or other thing apparently used, or capable of being used, for the purpose of transmitting or receiving messages across the sea by wireless telegraphy shall be found, it shall be lawful for such constable or constables to seize and carry away, or otherwise to secure the same; and if, upon a hearing before any two Justices of the Peace, they shall adjudge and determine that any such instrument, apparatus, or other thing, has been used, or is capable of being used, for either of the purposes aforesaid, they may adjudge the same to be forfeited, and such forfeiture may be in addition to any penalty which may be imposed on any person under this Act in respect of such instrument, apparatus, or other thing.

5. Any instrument, apparatus, or other thing which shall be adjudged to be forfeited under the provisions of this Act shall be sold or otherwise disposed of in such manner as the Governor shall direct, and if sold the net proceeds of such sale shall be paid into the public treasury, after payment thereout of such reward, if any, as the Governor shall award to the informer, or to any constable or constables executing the search warrant under which such articles were seized.

6. This Act shall continue in force until and throughout the last day of December, 1907. (*By the Wireless Telegraphy Act Continuing Act,* 1907, *the Act of* 1903 *is continued in force indefinitely.*)

1909.

B The Governor having informed the Legislature that a despatch has been received from the Secretary of State for the Colonies drawing attention to the desirability of making Regulations as to the use of Wireless Telegraphy apparatus on merchant ships, whether British or foreign, while in the territorial waters of these islands, it was deemed expedient to confer on the Governor in Council the power to make such Regulations as may be necessary for the purpose aforesaid, and the following Act came into force in March, 1909:—

1. It shall be lawful for the Governor in Council to make regulations as to the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in the territorial waters of these islands, for preventing such apparatus being worked so as to interfere with naval signalling, or with the working of any wireless

telegraph station lawfully established or worked in these islands, or with the transmission of messages between any such station and ships at sea.

2. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters of these islands shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases, or in such cases as may be deemed desirable.

3. Any regulations made under this Act may impose fines for any breach thereof not exceeding £20 for a single offence, and not exceeding £5 a day for a continuing offence, and such fines shall be recoverable with costs in any Court of Summary Jurisdiction consisting of any two Justices of the Peace.

4. All regulations made under this Act shall become operative on the date of their publication in the *Gazette*, or on such later date as shall be fixed by the regulations for the purpose.

BRAZIL

A—Extract from Act relating to Merchant Service.

B—Law No. 2719 of 31st December, 1912.

C—Law No. 2738 of January 4th, 1913.

A THE following is an extract from an Act relating to the Merchant Service:—

Article 159.—Those boats must without exception be provided with radio-telegraphic apparatus, approved by the General Direction of Telegraphs, with the necessary power to allow of communication with the wireless stations in the zones in which they trade, when:—

(*a*) they carry passengers and are employed in the coastal trade, of any description whatsoever, and having a registered tonnage of over 300 tons, and for those boats employed in river trade having a registered tonnage of over 500 tons.

(*b*) they are only employed in the coastal trade as cargo boats but carry over 30 (thirty) souls all told.

Article 160.—After the promulgation of this regulation, no ship shall be registered by any Port Authority if it has not complied with the regulations of the preceding Article, the licence to navigate being refused to any ship which, within one year from the date of the promulgation of this regulation, shall not have fulfilled the dispositions set forth herein.

B Law No. 2,719 of December 31st, 1912, fixes the wireless rates at 6 francs for a telegram up to 10 words, and 60 centimes for each word extra; included in the rate is the transmission between a coast station and the telegraph stations to which the wireless station is directly joined up.

There is also a tax of 25 centimes a word for every State that the telegram passes through. The ship tax, as fixed by the Telegraph Department, is 240 reis a word, and the coast station and forwarding charge is 360 reis, equalling together one franc; 10 words are charged for, and the extra tax of 25 centimes is collected when necessary.

C A new wireless district was created by Law No. 2,738 of January 4th, 1913, with a credit of 732 contos, to include the Acre, Amazonas and Para wireless stations, and these stations have since been taken over by the Telegraph Department and opened to public traffic.

BRITISH GUIANA

A—The Telegraph Ordinance, 1903.

B—Ordinance No. 7 of 1910.

A THIS Ordinance may be cited as "The Telegraph Ordinance, 1903."

2. In this Ordinance "Telegraph" means an electric, galvanic, or magnetic telegraph, a[illegible] includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communication by means of electricity, galvanism or magnetism, whether the same be transmitted by means of wires or cables or without wires or cables.

3. The Governor-in-Council shall have the exclusive privilege of establishing, maintaining and working telegraphs between the Colony and places outside of the Colony.

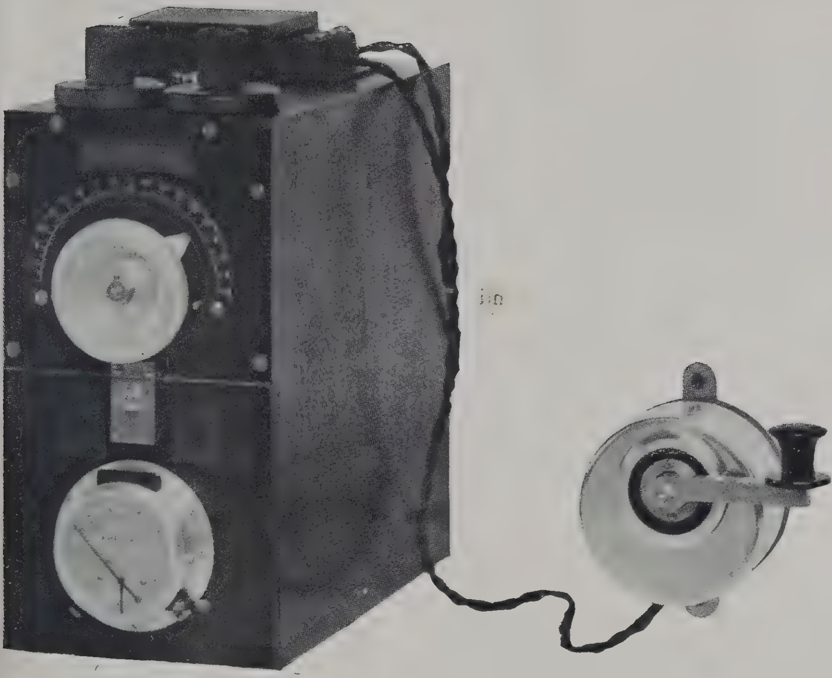
Provided that the Governor-in-Council may grant a licence on such conditions and in consideration of such payments as he thinks fit, to any person, company or body corporate, to establish, maintain, or work a telegraph between the Colony and any place or places outside the Colony; and

Provided that nothing in this Ordinance shall apply to or in any way affect the rights already granted to the West India and Panama Telegraph Company, Limited, under any Ordinance or Ordinances passed before the commencement of this Ordinance.

Ordinance No. 7 of 1910.

B 1. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship registered in the Colony, except under and in accordance with a licence granted in that behalf by the Governor-in-Council.

(2) A person shall not work any apparatus for wireless telegraphy installed on any merchant ship (whether British or foreign) whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor-in-Council, and the Governor-in-Council may, by any such regulations, impose penalties recoverable summarily for the breach of any



MARCONI TRANSMITTER, DESIGNED FOR AIRCRAFT.

[To face page 160.

such regulations, not exceeding fifty dollars for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or instals or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour and be liable on summary conviction thereof to a penalty not exceeding fifty dollars, and, on conviction on indictment, to a fine not exceeding five hundred dollars, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence.

(4) If a Justice of the Peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship within his jurisdiction without a licence in that behalf or contrary to the provisions of the regulations made under sub-section two of this section he may grant a search warrant to any police officer or any officer appointed in that behalf by the Governor or the Postmaster-General and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

(5) The expression "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided, That nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1910.

BRITISH HONDURAS

A.—Consolidated Law.
B.—Schedule.

WIRELESS Telegraphy in British Honduras is regulated by Chapter CXCIX. of the Consolidated Laws of British Honduras (revised edition), the text of which will be found below.

CHAPTER CXCIX. OF THE CONSOLIDATED LAWS OF BRITISH HONDURAS (REVISED EDITION).

TO REGULATE WIRELESS TELEGRAPHY.

A 1. *Interpretation.*—In this chapter "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing

in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *License to Instal, &c., Wireless Telegraphic Apparatus.*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a license granted in that behalf by the Governor.

(2) Every such license shall be in such form and for such period as the Governor may determine and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

3. *Apparatus not to be worked on merchant ship except in accordance with regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this chapter.

4. *Regulations.*—(1) The Governor may from time to time make regulations for carrying into effect the purposes of this chapter, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this chapter.

(2) The regulations in the schedule to this chapter shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships while in the territorial waters of the colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search Warrants.*—If a District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a license in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship contrary to the provisions of this chapter or of any regulations made under this chapter, or of any license granted under this chapter, he may grant a search warrant to any police officer or any person appointed in that behalf by the Superintendent of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalty for contravention of chapter.*—(1) Any person who shall offend against any provision of this chapter or any regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding two hundred and fifty dollars, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) *Procedure.*—Proceedings shall be taken before the District Commissioner for the Belize District on the complaint of the Superintendent of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

SCHEDULE—Section 4 (2).

REGULATIONS.

B i. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(*a*) Naval signalling, or

(*b*) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

ii. In these regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

iii. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

iv. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

v. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

vi. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

BRITISH NORTH BORNEO

BRITISH NORTH BORNEO has been included as a party in the International Radiotelegraphic Convention.

The following proclamation controls the use of wireless telegraphy :—

1. This proclamation may be cited as "The Wireless Telegraphy Proclamation, 1914," and shall come into force upon the publication thereof in the *Gazette*.

2. (i.) In this proclamation the expression "wireless telegraphy" means any system of communication by telegraph as defined by "The Telegraph Proclamation, 1901," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received;

The expression "locally owned ship" means a ship owned wholly by the Government or by bodies corporate established under and subject to the laws of this State, and having their principal place of business within this State.

(ii.) Nothing in this proclamation shall prevent any person from making or using apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in this State or on board any locally owned ship.

4. (i.) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in this State or on board any locally owned ship except under and in accordance with a licence granted in that behalf by the Governor.

(ii.) Every such licence shall be in such form and for such periods as the Governor may determine, and shall contain such terms, conditions, and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (i.) Any person establishing a wireless telegraph station without a licence in that behalf, or installing or working any apparatus for wireless telegraphy without a licence in that behalf, shall be liable to a fine not exceding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, provided that no proceedings shall be taken against any person under the proclamation except with the previous sanction of the Governor.

(ii.) On being satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, a magistrate may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (i.) The Governor may make and, when made, vary or cancel rules more particularly for all or any of the following matters:—

(*a*) For prescribing the form and manner in which applications for licences under this proclamation are to be made;

(*b*) For prescribing the fees payable on the grant of any licence;

(*c*) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship or a British or a foreign ship, in the waters of this State shall be worked so as to prevent the interference with naval

signalling or the working of any wireless telegraph station lawfully established, installed, or worked in this State or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(*d*) For prohibiting, except with the special or general permission of the Superintendent of Telegraphs, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether a locally owned ship or a British or a foreign ship, whilst such ship is in any of the harbours of this State;

(*e*) For prohibiting or regulating, in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that the Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether locally owned ships or British or foreign ships, in the waters of this State, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time, either in all cases or in such cases as may be deemed desirable;

(*f*) And generally for the more effectual carrying out of the provisions of this proclamation.

(ii.) No rules made in respect of the matters described in paragraphs (*c*), (*d*), and (*e*) of sub-section (i.) shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. On an application for a licence proving to the satisfaction of the Governor that the whole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted to such applicant, subject to such special terms, conditions, and restrictions as the Governor may think proper that such licence shall not be subject to any rent or royalty.

8. (i.) Every omission or neglect to comply with, and every act done or attempted to be done contrary to, the provisions of the proclamation, or of any rule made thereunder, or in breach of the conditions and restrictions subject to or upon which any licence has been issued, shall be deemed to be an offence against, not otherwise specially provided for, the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding five hundred dollars.

(ii.) All convictions, forfeitures, and fines under this proclamation, or any rules made thereunder, may be had and recovered before the Court of a Magistrate of the First Class.

CANADA

A—The Radiotelegraph Act.

B—Regulations.

C—Ship Licence.

A

WIRELESS Telegraphy in the Dominion was until 1913 regulated by Part IV. of the Telegraphs Act. (See YEAR-BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, 1913. Pp. 111

and 112.) This is now replaced by the Act which was assented to on June 6th, 1913, and reads as follows:

1. This Act may be cited as *The Radiotelegraph Act.*

2. In this Act, unless the context otherwise requires—

(*a*) "Minister" means the Minister of the Naval Service;

(*b*) "radiotelegraph" includes any wireless system for conveying electric signals or messages including radiotelephones;

(*c*) "coast station" means any radiotelegraph station which is established on land or on board a ship permanently moored and which is used for the exchange of messages and electric signals with ships at sea;

(*d*) "land station" means any radiotelegraph station or installation of radiotelegraphic apparatus which is not a coast station or a ship station;

(*e*) "ship station" means any radiotelegraph station established on board a ship which is not permanently moored.

3. No person shall establish any radiotelegraph station or instal or work any radiotelegraph apparatus in any place in Canada or on board any ship registered in Canada except under and in accordance with a licence granted in that behalf by the Minister.

4. From and after the first day of January, nineteen hundred and fourteen, no passenger steamer, whether registered in Canada or not—

(*a*) licensed to carry 50 or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than 200 nautical miles from one port or place to another port or place; or,

(*b*) licensed to carry 250 or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than 90 nautical miles from one port or place to another port or place; or,

(*c*) licensed to carry 500 or more persons, including passengers and crew, and going on any voyage which is or which includes a voyage of more than 20 nautical miles from one port or place to another port or place,

shall leave or attempt to leave any Canadian port unless such steamer is equipped with an efficient radiotelegraph apparatus, in good working order, capable of transmitting and receiving messages over a distance of at least one hundred nautical miles by night and by day, and in charge of a person fully qualified to take charge of and operate such apparatus.

(2) The owner, master or other person in charge of any passenger steamer which leaves or attempts to leave any Canadian port contrary to the provisions of this section shall, on summary conviction, be liable to a fine not exceeding $1,000 and costs, and such fine and costs shall constitute a lien upon such passenger steamer.

(3) This section shall not apply to passenger steamers plying on the rivers of Canada, including the River St. Lawrence as far seaward as a line drawn from Father Point to Point Orient, or on the Northumberland Straits, or on the Georgian Bay, or on the lakes of Canada other than Lakes Ontario, Erie, Huron and Superior, and the provisions of paragraph (*c*) of subsection I of this section shall not apply to steamers

making voyages on Lakes Ontario, Erie, Huron and Superior, the regular route for which is not at any point more than seven miles from the shore.

(4) This section shall not apply to steamers calling at Canadian ports solely for the purpose of obtaining bunker coal or provisions for the use of such steamer, or through stress of weather, or for repairs.

5. All persons operating land or cable telegraph lines shall transmit all messages destined to or coming from ship stations via coast stations under such rules as may be made by the Board of Railway Commissioners for Canada.

6. No one shall be employed as a radiotelegraph operator at any coast or land station unless he is a British subject, and all radiotelegraph operators at shore or land stations, or on ship stations on board any vessel registered in Canada, shall take and subscribe a Declaration of Secrecy in the form set forth in the Schedule to this Act, before a judge of any court, a notary public, a justice of the peace or a commissioner for taking affidavits, having authority or jurisdiction within the place where the oath is administered.

(2) Every person who has made the Declaration of Secrecy and who, either directly or indirectly, divulges to any person, except when lawfully authorised or directed so to do, any information which he acquired by virtue of his employment, is guilty of an offence and shall be liable on summary conviction to a penalty not exceeding $100 and to imprisonment for a term not exceeding six months.

7. Any person who sends or transmits or causes to be sent or transmitted any false or fraudulent distress signal, message, call or radiogram of any kind, or who without lawful excuse interferes with or obstructs any radio-communication, shall be guilty of an offence and shall be liable on summary conviction to a penalty not exceeding $500 and costs or six months' imprisonment.

8. If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that a radiotelegraph station has been established without licence in that behalf, or that any apparatus for radiotelegraphy has been installed or worked in any place or on board any ship registered in Canada within his jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Minister and named in the warrant.

(2) A warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any radiotelegraph apparatus which appears to him to be there used or intended to be there used for radiotelegraphy.

9. Everyone who establishes a radiotelegraph station or instals or works any radiotelegraph apparatus in violation of the provisions of this Act, or of any regulation made hereunder, shall be liable on summary conviction to a penalty not exceeding $50, and on conviction on indictment to a fine not exceeding $500 and to imprisonment for a term not exceeding twelve months, and in either case shall be liable to forfeit to His Majesty any radiotelegraph apparatus installed or worked without a licence.

(2) No proceedings shall be taken against any person under this section, except by order of the Minister.

10. The Governor in Council may—

(*a*) prescribe the tariff of fees to be paid for licences and for examination for certificates of proficiency held and issued under the provisions of this Act;

(*b*) accede to any international convention in connection with radiotelegraphy, and make such regulations as may be necessary to carry out and make effective the terms of such convention and prescribe penalties recoverable on summary conviction for the violation of such regulations; provided that such penalties shall not exceed $500 and costs;

(*c*) make regulations for the censorship and controlling of radiotelegraph signals and messages in case of actual or apprehended war, rebellion, riot or other emergency.

11. The Minister may make regulations—

(*a*) prescribing the form and manner in which applications for licences under this Act are to be made;

(*b*) classifying ship, coast and land stations and prescribing the type and range of the regular equipment and the emergency equipment to be installed in the several classes of stations;

(*c*) defining the different kinds of licences that may be issued, their respective forms and the several periods for which they shall continue in force;

(*d*) prescribing the conditions and restrictions to which the several licences shall respectively be subject;

(*e*) prescribing the different classes of certificate of proficiency and the class of certificate necessary to qualify persons as operators for the several classes of ship, coast and land stations;

(*f*) for the examination of persons desiring to obtain certificates of proficiency as radiotelegraph operators and to determine the qualifications in respect of age, term of service, skill, character and otherwise to be required for such certificates;

(*g*) prescribing the watches to be kept by operators and the number of operators to be maintained and kept at the different classes of ship, coast and land stations;

(*h*) for the inspection of radiotelegraph stations;

(*i*) to provide how radiotelegraph apparatus installed upon any foreign or British ship (whether such British ship is registered in Canada or elsewhere) shall be operated while such ship is within the territorial waters of Canada;

(*j*) to compel all radiotelegraph stations to receive, accept, exchange and transmit signals and messages with such other radiotelegraph stations and in such manner as he may prescribe;

(*k*) for the effective carrying out of the provisions of this Act.

(2) The Minister may, by regulation, authorise the imposition of a penalty not exceeding fifty dollars and costs or three months' imprisonment for the violation of any regulation made under this section, and any such penalty may be recovered upon summary conviction.

12. All regulations made under the provisions of the two sections immediately preceding shall be published in *The Canada Gazette*, and shall be laid before both Houses of Parliament within ten days after the publication thereof if Parliament is then sitting, and if Parliament is not then sitting, then within ten days after the next meeting thereof.

13. His Majesty may, at any time, assume, and for any length of time retain, possession of any radiograph station and of all things necessary to the sufficient working thereof, and may, for the same time require the exclusive service of the operators and other persons employed in working the same; and the person owning or controlling the station shall give up possession thereof, and the operators and other persons so employed shall, during the time of such possession, diligently and faithfully obey such orders, and transmit and receive such signals, calls and radiograms as they are required to receive and transmit by any duly authorised officer of the Government of Canada.

(2) If the Minister and the person owning or controlling any radiotelegraph station taken possession of by the Crown under the provisions of this section cannot agree as to the compensation to be paid by the Crown for such taking possession, the Minister shall refer the matter to the Exchequer Court of Canada for adjudication.

14. Part IV. of *The Telegraphs Act* is repealed.

SCHEDULE.

DECLARATION OF SECRECY.

I, A. B., solemnly and sincerely promise and declare that I will faithfully and honestly fulfil the duties which devolve upon me as radiotelegraphic operator, and that I will not, either directly or indirectly, divulge to any person, except when lawfully authorised or directed so to do, any information which I acquire by virtue of my employment as such operator, or which may come to my knowledge through the operation of any radiotelegraphic installation.

Declared before me at ....
this .... day of ...., 19....
[*Signature of declarant.*]

REGULATIONS.

Part I.

B Approved by the Governor in Council and issued in accordance with Section 10 of the Radiotelegraphic Act, Chapter 43, Statutes 1913.

Paragraphs 1 and 2 deal with FEES for the Licences and Examinations. *Paragraph* 3 lays it down that:—

(1) Provisions of the International Radiotelegraph Convention of London, 1912, and of the regulations annexed thereto, shall be observed by all "coast stations" established in Canada, and by all "ship stations" on board any vessel registered in Canada.

(2) That any person who instals or works any Radiotelegraph Apparatus at any of the above-mentioned stations in violation of this regulation, shall be liable on summary conviction to a fine not exceeding five hundred dollars ($500) and costs.

Paragraphs 4 and 5 deal with Control of Stations in the following terms :—

CONTROL OF STATIONS IN CASE OF EMERGENCY

4. (i) *Coast and Land Stations.*—If, and whenever in the opinion of the Minister an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the apparatus of any coast or land station, it shall be lawful for the said Minister, by warrant under his hand, to direct and cause so much of the apparatus, as is within Canada or the territorial waters thereof, or any part of the apparatus, to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's Service and subject thereto for such ordinary services as to the said Minister may seem fit, and in that event, any person, authorised by the said Minister, may enter upon the stations, offices and works of any coast or land station or any of them and take possession thereof and use the same as aforesaid.

(ii) The Minister may, when he considers such an emergency as aforesaid to have arisen, instead of taking possession of such coast or land station, direct and authorised such persons as he may think fit to assume the control of the transmission of messages by the apparatus of such station, either wholly or partly and in such manner as he may direct, and such persons may enter upon the station premises accordingly, or the said Minister may direct the owner or his representative to submit to him or any person authorised by him all messages tendered for transmission or arriving by the apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said Minister may prescribe, and the owner or his representative shall obey and conform to all such directions.

(iii) The Minister may, when he considers such emergency as aforesaid to have arisen, close any coast or land station and cause the removal therefrom of the apparatus or any part thereof.

5. (i) *Ship Stations.*—If, and whenever, in the opinion of the Minister, an emergency shall have arisen in which it is expedient for the Public Service that the Government shall have control over the transmission of messages by the apparatus of a radiotelegraph station on board any Canadian registered vessel, it shall be lawful for the said Minister, by warrant under his hand, to direct and cause the apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's Service and, subject thereto, for such ordinary services as to the said Minister may seem fit, and in that event, any person authorised by the said Minister may enter upon any ship station and take possession thereof and use the same as aforesaid.

(ii) When the Minister considers such an emergency as aforesaid to have arisen, he may, instead of taking possession of such ship station, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the apparatus of such station, either wholly or partly, and in such manner as he may direct, and such persons may enter upon the station premises accordingly or the said Minister may direct the owner or his representative to submit to him

or any person authorised by him all messages tendered for transmission or arriving by the apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said Minister may prescribe, and the owner or his representative shall obey and conform to all such directions.

PART II.

Issued by the Minister of the Naval Service in accordance with Section 11 of the Radiotelegraphic Act, Chapter 43, Statutes 1913.

Paragraph 1 deals with application for LICENCES, which must be made to the Deputy Minister of the Naval Service, Ottawa, and *Paragraph* 2 deals with the CLASSES OF LICENCES, which are subdivided into :—

1. Limited coast stations.
2. Public commercial stations.
3. Private commercial stations.
4. Experimental stations.
5. Amateur experimental stations.
6. Technical or training school stations.
7. Ship stations.

N.B.—(2) to (6) inclusive are known as the class of "land stations," (1) and (7) as "coast" and "ship" stations respectively.

Paragraph 3 deals with duration of licences, *paragraph* 4 with limited coast licences and runs as follows :—

Limited coast licences will only be granted with respect to stations in localities not served by a regular Government coast station; such stations will be allowed to undertake a limited correspondence with ships at sea determined by the object of such correspondence. They must exchange public messages with such ship, coast and land stations as are designated in the license, but with no other stations whatsoever.

For ship to shore working they must be operated in accordance with the provisions of the International Radiotelegraph Convention, and they must employ such wave-lengths below 600 metres or above 1,600 metres as are specified in the licence.

The watches to be maintained and the number and class of operators to be carried are to be as specified in the licence, the regular form of which is annexed hereto.

(Forms N. W. 42.)

Paragraphs 5, 6, and 7 deal with the conditions appertaining to the issue of licenses to land stations (see list in *paragraph* 2, Nos. (2) and (6)).

Paragraphs 8 to 31 deal with Special Regulations for (*a*) Experimental and (*b*) Amateur Experimental Stations.

SPECIAL REGULATIONS FOR EXPERIMENTAL STATIONS.

8. Applicants for an experimental licence must state in their application what wave-length they desire to use; the following lengths being available :—

Below 200 metres.
450 ,,
Above 1900 ,,

In special cases and for short periods the Minister shall have power to permit the use of 300, 600 and 1,800 metres for the purpose of testing or demonstrating commercial apparatus, such permission to be given by letter under his hand.

9. The station is strictly limited to the use of such wave-length or wave-lengths as are specified in the licence.

10. When transmitting on wave-lengths of 100 metres or less the station must be worked by a person holding an amateur experimental certificate of proficiency (see Regulation No. 97), and when transmitting on wave-lengths greater than 100 metres it must, if it be within the range of any commercial or coast station, be worked by a person holding either a "first class," second class," or "experimental" certificate of proficiency in radiotelegraphy. (See Regulations Nos. 93, 94, and 96.)

11. The power used, measured at the terminals of the transformer, must not exceed ½ k.w.

In special cases, however, such as that of a commercial company desirous of testing and demonstrating apparatus, or stations so far removed from any commercial station or route of navigation as to preclude any possibility of interference, the Minister may at his discretion permit the use of greater powers than ½ k.w.

12. The waves emitted must be as little damped as possible, and in no case shall the logarithmic decrement of a complete oscillation exceed two-tenths. The coupling between the primary and secondary of the oscillation transformer shall not be closer than that which gives a difference of five per cent. between the mean wave-length and either of the two waves emitted by the coupled circuits.

13. A distinctive call signal will be allotted to each station, commencing with the letter "X," *e.g.*, XAA, XAB, which signal shall be sent not less than three times at the termination of every transmission.

14. The regulations of the International Radiotelegraph Convention must, where applicable, be observed at the station.

15. The station, when operating, must listen for the signal "STP," which will indicate that an experimental station is interfering with commercial business.

The latter signal will only be made use of by certain authorised Government stations and will not be used unless absolutely necessary. The signal "STP" will, whenever possible, be preceded by the call signal allotted to the experimental station to which the interference is attributed and will be followed by the call signal of the Government station. On receipt of the "STP" signal, experimental stations will absolutely cease to operate until the Government station gives the signal "Cancel STP."

16. The aerial must be connected to the transmitting apparatus only when actual communication is in progress or when measurements are being taken. At all other times, such as when the spark is being tested or sending is being practised the aerial must be disconnected.

17. When the licensed station is in the vicinity of a commercial station it should be connected with the local telephone exchange so that instant communication may be established in case of interference.

18. *Amateur Experimental Licences.*—Amateur experimental licences will be granted to small stations used for instruction, experimental purposes, or amusement by persons relatively inexperienced in operating.

In addition to the provisions contained in the regular form of amateur experimntal licence annexed hereto (Form No. W. 44), the following special regulations will apply to all amateur experimental stations.

SPECIAL REGULATIONS FOR AMATEUR EXPERIMENTAL STATIONS.

19. At amateur experimental stations the power used measured at the terminals of the transformer, must not exceed ½ k.w.

20. The wavelengths which may be used vary with the distance between the licensed station and any commercial coast or land station or a route of navigation as follows :—

For Transmission—

Class 1.—Station located within 5 miles of a commercial coast or land station or a route of navigation, shall not use a transmitting wavelength greater than 50 metres;

Class 2.—Stations located more than 5 but less than 25 miles from a commercial coast or land station or a route of navigation, shall not use a transmitting wavelength greater than 100 metres;

Class 3.—Stations located more than 25 but less than 75 miles from a commercial coast or land station or route of navigation, shall not use a transmitting wavelength greater than 150 metres;

Class 4.—Station located more than 75 miles from a commercial coast or land station or route of navigation, shall not use a transmitting wavelength greater than 200 metres.

21. In cases where transmitting apparatus is installed the natural wavelength of the aerial and the length of the emitted waves must be as specified in the licence; in general this wavelength will be the maximum allowable under Regulation No. 20.

22. In cases where no transmitting apparatus is installed on the station, no limit is placed on the length of the aerial which may be used provided it is employed for the purpose of reception only.

23. The station must be worked by a person holding an amateur experimental certificate of proficiency (see Regulation No. 97).

24. The waves emitted must be as little damped as possible, and in no case shall the logarithmic decrement of a complete oscillation exceed two-tenths. The coupling between the primary and secondary of the oscillation transformer shall not be closer than that which gives a difference of 5 per cent. between the mean wavelength and either of the two waves emitted by the coupled circuits.

25. A distinctive call signal will be allotted to each station commencing with the letter "X," e.g., XAA, XAB, which signal must be sent not less than three times at the termination of every transmission.

26. The regulations of the International Radiotelegraph Convention must, where applicable, be observed by the station.

27. The station must take every precaution to prevent interference with the working of other stations.

28. The station, when operating, must listen for the signal "STP" which will indicate that an amateur experimental station is interfering with commercial business.

29. The latter signal will only be made use of by certain authorised Government stations and will not be used unless absolutely necessary. The signal "STP" will, whenever possible, be preceded by the call signal allotted to the amateur experimental station to which the interference is attributed and will be followed by the call signal of the Government station. On receipt of the "STP" signal, all amateur experimental stations will cease to operate until the Government station gives the signal "Cancel STP."

30. The aerial must be connected to the transmitting apparatus only when actual communication is in progress or when measurements are being taken. At all other times, such as when the spark is being tested or sending is being practised, the aerial must be disconnected.

31. When the licensed station is in the vinicity of a commercial station it should be connected with the local telephone exchange so that instant communication may be established in case of interference.

Paragraph 32 deals with Technical and Training-School Licences granted to stations intended for educational purposes.

Paragraph 33 deals with SHIP STATION LICENCES which "will be granted to stations on British ships registered in Canada."

Paragraphs 34 to 36 deal with the CLASSIFICATION OF SHIP STATIONS, and run as follows:—

Classification of Ship Stations.

34. *Class* 1.—All "sea-going" passenger vessels registered in Canada with an average speed of 15 knots or more, carrying 50 or more persons and plying between ports more than 200 miles apart; also all "sea-going" passenger vessels registered in Canada with an average speed of 13 knots or more, carrying 200 or more persons and plying between ports more than 500 miles apart.

35. *Class 2a.*—All "sea-going" passenger vessels registered in Canada affected by the provisions of Section 4 of The Radiotelegraph Act, which do not come under Class 1.

Class 2b.—All vessels registered in Canada plying on "coasting voyages" or on the "inland waters" of Canada which are affected by the provisions of Section 4 of The Radiotelegraph Act."

36. *Class* 3.—All vessels registered in Canada not affected by the provisions of Section 4 of The Radiotelegraph Act, but which have been voluntarily equipped with radiotelegraph apparatus.

> The terms "sea-going," "coasting voyage," and "inland waters" are to be as defined in Section 72 of The Canada Shipping Act, Chapter 113, R.S., 1906.

Regular Equipment.

37. *Vessels in Class* 1.—The regular radiotelegraph equipment must have a minimum range of 100 nautical miles at all hours of the day and night with a similar equipment on a similar vessel and with all Canadian Government coast stations.

38. The normal wavelength of the emitted wave must be 600 metres; in addition the set must be capable of being operated on a wavelength of 300 metres, and means are to be provided whereby a quick change-over from one wavelength to the other may be effected.

39. In the case of small vessels on which it is materially impossible to use a transmitting wavelength of 600 metres, 300 metres may be employed; such ship stations, however, must be fitted with a receiver capable of tuning up to a 600 metre wavelength and the watches must be maintained on that wavelength.

40. The logarithmic decrement of a complete oscillation must not exceed two-tenths (0.2).

41. The power used by the transmitter, measured at the terminals of the generator of the station, must not, under normal circumstances, exceed 1 k.w., except in the special case provided for in article 35, paragraph 2, of the International Radiotelegraph Convention of London, 1912.

42. In the case of equipments using a power of more than 50 watts, an arrangement must be provided whereby several ranges, each less than the normal range, may be speedily obtained, the shortest range being, approximately, 15 nautical miles.

43. The use of "plain aerial" except in cases of distress or in installations using a power of less than 50 watts, is prohibited.

44. *Vessels in Class* 2.—Regulations No. 37 to No. 43, inclusive, shall apply to the equipments on vessels in Classes 2a and 2b.

45. *Vessels in Class* 3.—Regulations No. 38 to No. 43, inclusive, shall apply to equipments on vessels in Class 3.

Emergency Equipments.

46. *Class* 1.—Every vessel in Class 1 must carry an emergency source of power, instantly available, which shall be capable of operating the equipment for six hours, under normal conditions, with a minimum range of 80 nautical miles.

47. *Class* 2.—Vessels in Classes 2a and 2b must carry a similar source of power with the exception that the minimum normal range of the equipment is reduced to 50 nautical miles.

48. *Class* 3.—Vessels in Class 3 will not be required to carry emergency sets.

49. *Emergency, Equipments Generally.*—(1) The emergency equipment in its entirety, must in all cases be placed in the upper part of the ship, as high as practicably possible and in a position of the greatest safety.

(2) The emergency equipment may take the form of complete transmitter. Storage battery sets, of sufficient capacity to operate the regular radiotelegraph equipment of the vessel for the specified time, are, however, strongly recommended.

(3) A plain aerial transmitter may be installed as an emergency equipment, provided (subect to the provisions of Regulation No. 43) the use of the same is confined exclusively to distress calls.

(4) Regulations No. 46 to No. 49, inclusive, will become effective on and after December 1st, 1914.

50. *Spare Parts.*—Every ship station shall carry a reasonable number of spares of such parts of both the main and emergency radiotelegraph equipment as are subject to undue wear, deterioration, or liability to accident.

51. *Certificate of Inspection.*—The radiotelegraph installation on all British vessels registered in Canada will be subject to inspection by an officer of the Department of the Naval Service at least once a year, who, if the apparatus is found to comply with the terms of The Radiotelegraph Act and the regulations issued thereunder, shall issue to the vessel a "Radiotelegraph Inspection Certificate" certifying that the equipment has been duly inspected and that it complies with the provisions of the licence issued therefore by the Minister of the Naval Service, such certificate to be posted in the radiotelegraph cabin.

52. *Time.*—Radiotelegraph stations on vessels plying on the West Coast shall observe Pacific time, and those on the Great Lakes and East Coast Eastern Standard time.

WATCHES.

53. *Vessels in Class* 1.—A constant watch must be maintained at the radiotelegraph stations on all vessels in Class 1 (Regulation No. 34) whilst they are en route, and two operators, holding first-class certificates must be carried on such vessels.

54. *Vessels in Class 2a.*—A constant watch from 8 a.m. to 3 p.m. and a watch during the first ten minutes of every other hour of the day must be maintained at the radiotelegraph stations on all vessels in Class 2a (Regulation No. 35) whilst they are en route; the ten minute watch may be maintained by an operator holding a "Second-class Certificate of Proficiency," or by a person holding a regular "Third-class Certificate."

55. *Vessels in Class 2b.*—Watches as hereinafter specified in Regulations No. 57 to No. 67, must be maintained at the radiotelegraph stations on all vessels in Class 2b, whilst they are en route.

56. *Vessels in Class* 3.—No fixed watches need be maintained at radiotelegraph stations on vessels in Class 3 (Regulation No. 36).

PACIFIC COAST.

57. *Class 2b—Local Coasting Runs.*—Vessels in Class 2b, when plying on ferry or local runs between any ports in British Columbia south of Queen Charlotte Sound or between any ports in the above province north of that Sound and not steaming for more than 16 hours in any day, must, whilst en route, maintain watches during the following periods:—

7.30 a.m. to 8.00 a.m. and the last half hour of every hour until 8.00 p.m.

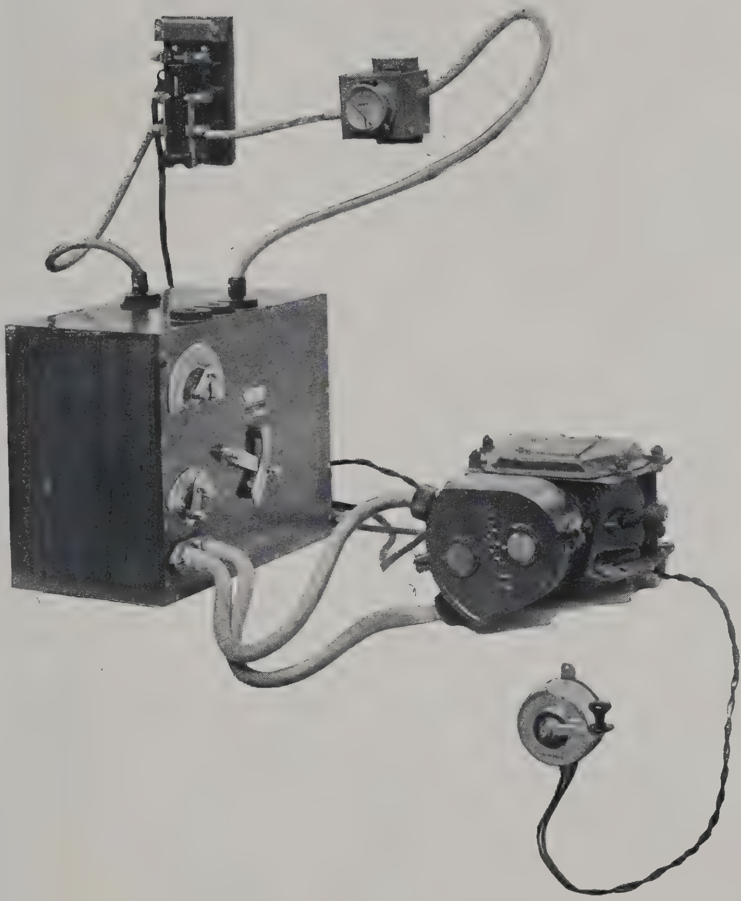
9.30 p.m. to 10.00 p.m.

11.30 p.m. to 12.00 midnight.

3.30 a.m. to 4.00 a.m.

5.30 a.m. to 6.00 a.m.

In the case of vessels affected by Sub-section (c) of Section 4 of The Radiotelegraph Act (500 persons—ports more than 20 miles apart),



MARCONI 350–500 WATT AIRCRAFT STATION APPARATUS WITH MUSICAL SPARK.

[*To face page* 176.

the above watches need only be kept whilst the boats are en route between ports more than 20 miles apart.

58. Vessels in Class 2b, when plying on ferry or local runs between any ports in British Columbia south of Queen Charlotte Sound or between any ports in the above province north of that Sound and steaming for more than 16 hours in any one day, must, whilst en route, maintain watches as prescribed in Regulation No. 57, with the exception that a watch may be maintained from 1.30 a.m. to 2.00 a.m. instead of from 3.30 a.m. to 4.00 a.m., and no watch need be kept between the hours of 2.00 a.m. and 9.30 a.m.

59. *Class 2b—Coasting Vessels Plying North and South.*—Vessels in Class 2b plying on runs between ports in British Columbia south of Queen Charlotte Sound, and ports in the same province, north of that Sound, or vice versa, must, whilst en route, maintain watches during the following periods :—

7.30 a.m. to 8.00 a.m.
10.30 a.m. to 11.00 a.m.
1.30 p.m. to 2.00 p.m.
4.30 p.m. to 5.00 p.m.
7.30 p.m. to 8.00 p.m.
10.30 p.m. to 11.00 p.m.

If, during these periods, the vessel is in the immediate vicinity of any place mentioned in the lists given in Regulations 60 and 61, communication must be established with the coast station shown, or should the vessel reach such vicinity out of the above periods the ship station must call such coast station until communication is established or it becomes out of range.

60. *North bound* :—

Station.	Locality.	
	Day Time. Between 7.30 a.m. and 11 p.m.	Night Time. Between 11 p.m. and 7.30 a.m.
Gonzales Hill ...	Trial Island	Trial Island.
Point Grey	The First Narrows or Abeam Porlier Pass.	The First Narrows or Abeam Porlier Pass.
Cape Lazo	Abeam	
,, ...	Cape Mudge	Cape Mudge.
Alert Bay	Blinkensop Bay	
,, ...	Abeam	Abeam .
,, ...	Pine Island...	Pine Island.
Triangle Island ...	,, ...	,,
,, ...	Egg Island	Egg Island.
,, ...	Before reaching Harold Point.	Before reaching Harold Point.
,, ...	Ivory Island	Ivory Island.
,, ...	Vancouver Rock	
Digby Island ...	Watson Rock	Watson Rock.
,, ...	Abeam	Abeam.
,, ...	,, ...	,,
,, ...	Hodgson Island	
,, ...	Pointers	Pointers.

61. *South bound* :—

Station.	Locality. Day Time. Between 7.30 a.m. and 11 p.m.	Locality. Night Time. Between 11 p.m. and 7.30 a.m.
Digby Island ...	Pointers	Pointers.
,, ...	Hodgson Island	
,, ...	Abeam	Abeam.
,, ...	,, ...	,,
,, ...	Lawyer Island	Lawyer Island.
Triangle Island ...	Vancouver Rock	Vancouver Rock.
,, ...	Ivory Island	
,, ...	Harold Point	Harold Point.
,, ...	Egg Island	Egg Island.
,, ...	Pine Island...	Pine Island.
Alert Bay	,, ...	,,
,, ...	Abeam	
,, ...	Blinkensop Bay	Blinkensop Bay.
Cape Lazo	Chatham Point	
,, ...	Abeam	Abeam.
Point Grey	Sisters	Sisters ....
,, ...	Abeam	Abeam.
Gonzales Hill ...	Active Pass	Active Pass.

Paragraphs 62 to 67 deal with SPECIAL REGULATIONS for vessels plying on the GREAT LAKES and the EAST COAST, whilst in *paragraph* 68 we return to the general regulations affecting "operation," which run as follows :—

Operation.

68. *Power Available.*—Power for the operation of the main equipment shall be available during the periods a watch is being maintained under Regulations No. 53 to No. 67.

69. *Control of Ship Stations.*—The operation of the radiotelegraph station on any vessel shall be under the supreme control of the master of such vessel.

70. *Censorship by the Master of a Vessel.*—The master of a vessel shall have the right to censor all messages addressed to or transmitted by a radiotelegraph station on board his vessel, but such master shall not divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal), or make any use whatever of any message coming to his knowledge through the exercise of such censorship, nor shall the master or any operator divulge to any person (other than the properly authorised officials of the Government or a competent legal tribunal), or make any use whatever of any message (other than a message of distress) coming to his knowledge and not intended for the said station.

71. *Form W.* 40.—A copy of Form W. 40 must be posted in every radiotelegraph station; these forms may be obtained from the Deputy Minister of the Naval Service on request.

72. *Secrecy of Messages.*—No message shall be delivered, or its contents divulged, to any person except the addressee, his or her

accredited agent, or such properly authorised persons as are essential for the forwarding of such message to its destination.

73. *Superfluous Signals*.—The transmission of superfluous signals by any ship or coast station is absolutely prohibited; trials and practices are forbidden except under such circumstances as to preclude the possibility of interference with other stations.

74. *Profane Language*.—No person shall transmit or make a signal containing profane words or language.

OPERATORS.

75. *Operators*.—Except in cases of emergency or distress the apparatus of all coast, land or ship stations must only be worked by persons holding regular Certificates of Proficiency in Radiotelegraphy, and who have subscribed to a Declaration of Secrecy, as prescribed in Section 6 of The Radiotelegraph Act.

76. *British Subjects*.—All operators on coast, ship or land stations must (subject to the provisions of Regulation No. 88b) be British subjects, and the different classes of stations must be worked by operators holding Canadian "Certificates of Proficiency" (subject to the provisions of Section 77) not inferior to those hereinafter specified in Regulations No. 80 to No. 86, for the respective classes of stations.

77. *Ship Stations*.—The holders of Certificates of Proficiency in Radiotelegraphy issued in accordance with the provisions of the International Radiotelegraph Convention by His Majesty's Postmaster-General, the Administration of any British self-governing Dominion or Colony, or the Government of India, will (subject to the provisions of these regulations) be entitled to act as radiotelegraph operators on any Canadian vessels.

78. *Certificates of Proficiency*.—The following Certificates of Proficiency in Radiotelegraphy are issued by the Department:—

Ship Stations—

(1) First-class Certificate.

(2) Second-class Certificate.

(3) Third-class (Watcher's) Certificate.

Land and Coast Stations—

(4) Extra First-class Certificate.

(5) First-class Certificate.

(6) Second-class Certificate.

(7) Third-class (Watcher's) Certificate.

(8) Experimental Certificate.

(9) Amateur Experimental Certificate.

79. *Emergency Certificates*.—In cases of emergency, when it is not possible to hold an examination, the Minister shall have power to issue "Emergency Certificates" of any class, valid for not more than six months, provided satisfactory proof is forthcoming that the operator has the necessary qualifications for the position.

The holders of such Emergency Certificates must attend a regular examination, when the first opportunity occurs, and the said certificate

will automatically expire on the day on which the result of such examination is published.

Operators to be Carried.

80. *Ships in Class* 1.—Ships in Class 1 must carry two operators holding First-class Certificates.

81. *Ships in Class 2a.*—Ships in Class 2a must carry two operators, one First-class and one Second-class, or one First-class and one Third-class.

82. *Ships in Class 2b.*—Ships in Class 2b must carry one First-class Operator.

83. *Ships in Class* 3.—Ships in Class 3, if they undertake public correspondence, must carry one First-class operator or, if their service is limited exclusively to the ship's business, one Second-class operator.

84. *Coast Stations.*—(1) All public coast stations open for public correspondence and maintaining a constant watch must carry three operators, each of whom must hold a Canadian First-class Certificate of Proficiency. The Minister shall, however, have power in special cases to permit the employment of other persons on such stations for the purpose of maintaining the constant watch above mentioned, provided such persons are capable of transmitting and receiving in the Morse Code at a speed of twenty words a minute as prescribed in sub-sections (a) and (b) of Regulation No. 89 and provided the station is in charge of an operator holding a First-class Certificate of Proficiency.

(2) This regulation will become effective on and after the 1st of January, 1915.

85. All other coast stations shall carry such operators holding such certificates as are specified in the licence issued for the station under Regulation No. 4.

86. *Land Stations.*—Land stations (commercial, experimental, etc.) shall carry such operators holding such certificates as are specified in the licence issued for the station under Regulations Nos. 5, 6, 7, 18 or 32, according to the classification of the station.

Paragraphs 87 and 88 deal with applications for Radiotelegraph Certificates, *which can only be granted to British subjects.*

Paragraphs 89 to 101 (inclusive) deal with examinations for the various classes of certificates.

Paragraph 102 treats of the INSPECTION OF STATIONS and runs as follows:—

"Any duly authorised officer of the department may, from time to time, and at all reasonable times, enter upon any coast, land or ship station, within the jurisdiction of Canada, for the purpose of inspection, and may inspect any apparatus fixed or in use in such station, for the purpose of sending and receiving messages by radiotelegraphy and all other telegraphic instruments and apparatus fixed or being in such station, also the working and user of such apparatus and telegraphic instruments, and all books and papers used in connection with the operation of such station. His authority will be in the form of a letter signed by the Deputy Minister of the Department of the Naval Service."

Paragraphs 103 and 104 deal with the Operation of Ship Stations within the Territorial Waters or Harbours of Canada, and run (after having been amended by special circular of August 15th, 1914) as follows :—

103. The Radiotelegraph Stations on board ships (other than H.M. ships of war or Canadian Government vessels) shall not be worked while such ships are within the Territorial Waters of Canada, unless specific permission is granted therefor by the controlling Canadian coast stations for the locality, and then only provided such working does not interfere with the operation of any coast station established in Canada, and that the provisions of the Radiotelegraph Convention of London, 1912, and the Service Regulations, annexed thereto, are strictly observed.

104. The Radiotelegraph Stations on board ships (other than H.M. ships of war or Canadian Government vessels) shall not be worked whilst such ships are within a harbour of the Dominion of Canada.

105. *Penalty*.—Any person who violates any of the provisions of these regulations shall be liable on summary conviction to a penalty not exceeding fifty dollars and costs or three months' imprisonment.

Paragraph 106 (specially issued in supplementary circular dated January 20th, 1916) deals with the WAVELENGTHS to be used by SHIP STATIONS as follows :—

All Canadian Licensed Ship Stations shall use the wavelength of 600 metres exclusively during the period of hostilities.

* * * * * *

Separate forms of licence are issued for Limited Coast Stations, Public Commercial Stations, Private Commercial Stations, Experimental Stations, and Amateur Experimental, and the forms of each will be found in the copy of the Radiotelegraphic Act and Regulations printed at Ottawa in 1914, from which the above particulars have been extracted.

Ship Licence.

C THE herein named ...., resident of ...., hereinafter called the licensee, is hereby licensed to establish and operate a radiotelegraph station on board the vessel .... for the term of one year commencing ...., and terminating on ...., and to instal and operate at such station the apparatus mentioned in the schedule hereto, on payment of the sum of one dollar, being the licence fee for the privilege above named.

This licence is subject to the following terms, conditions and restrictions :—

1. In this licence the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something, either in the subject or context, repugnant to such construction, that is to say :

The expression "marine signalling" means signalling by means of any system of wireless telegraphy between two or more ships, between ships and shore stations and any other wireless telegraph station, or between shore stations and ships; and the term "Minister" means the Minister or the Deputy Minister of the Naval Service for the time being.

2. (1) The licensee shall not establish, instal or operate any apparatus for wireless telegraphy, except the apparatus hereinafter called the "licensed apparatus" specified in the said schedule hereto.

(2) No tolls, fees or other consideration shall be received, levied or collected by the licensee until the same have been approved of by the Board of Railway Commissioners.

3. (1) The licensee shall so operate the licensed apparatus as not to interfere with the working of any wireless telegraph station established in Canada, or with marine signalling on the waters or territory of Canada or neighbouring waters or territory.

(2) With a view to preventing such interference as aforesaid, the licensee shall comply with all directions which shall be given to the licensee by the Minister and with all rules prescribed by the Minister for observance by his licensees :—

(*a*) With respect to all arrangements to be adopted for the purposes of syntony or enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station;

(*b*) With respect to any alteration of messages which the Minister may think necessary; and

(*c*) Generally with respect to avoiding interference between one wireless telegraph station and another.

(3) The licensed apparatus shall not, without the consent of the Minister, be altered or modified in respect of any of the particulars mentioned in the schedule hereto.

4. (1) The licensee shall, if so required in writing by the Minister, cease to operate the licensed apparatus for such period (not exceeding ...... hours in any one day) as may be specified by the Minister.

5. Subject to the provisions of the licence, and in accordance with the regulations issued from time to time by the Minister, the licensee shall transmit and receive messages by means of the licensed apparatus to and from any coast station or to and from any other ship without regard to the particlar system of wireless telegraphy installed at such coast station or such other ship, on equal terms without favour or preference, whether as regards rates of charge, order of transmission or otherwise.

6. The licensee shall not be obliged to transmit and receive commercial messages by means of the licensed apparatus to and from a ship station on a ship registered in a country which does not adhere to the International Radiotelegraphic Convention, unless instructed so to do by the Minister in his regulations.

7. (1) If and whenever any department of the Government shall require the licensee, his servants or agents to transmit by means of the licensed apparatus any messages on His Majesty's service (including messages to and from ships of His Majesty's Royal Navy or Canadian Government vessels), such messages shall have priority over all other messages, and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages; and the rates to be charged on such messages shall not exceed half the rates charged the ordinary public.

(2) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

8. The licensee shall, so far as possible, receive from all other stations all requests for assistance and all signals of distress, and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in his power.

9. The licensee shall not divulge to any person (other than properly authorised officials of the Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the licensee and transmitted by marine signalling or by any system of wireless telegraphy.

10. All messages transmitted by means of the licensed apparatus shall be copied in full in registers to be kept by the licensee for that purpose, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its places of origin and ultimate destination and such further particulars as the Minister shall from time to time reasonably require to be shown, messages on His Majesty's service being in such registers distinguished from other messages. The licensee shall preserve all used message forms, written and printed, and transcripts of messages and all other papers for such periods as is from time to time prescribed by the regulations of the International Radiotelegraphic Convention, and such registers and message papers shall be open to the inspection of the Minister or his officers thereto authorised at the head office of the licensee, in Montreal between the hours of 10 a.m. and 5 p.m., on every day except Sunday or a public holiday.

11. The Minister or his officers may from time to time and at all reasonable times enter upon the herein licensed station for the purpose of inspection, and may inspect any apparatus fixed or in use in such station for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such stations, and the working and user of such apparatus and telegraphic instruments.

12. The licensee shall prepare a detailed return of the messages handled by the licensed station during each month on the forms provided for that purpose by the Minister, and shall forward the same to the Minister at the end of each month.

13. (1) The licensee shall observe at the said station the provisions of the International Radiotelegraphic Convention as adhered to by His Majesty in respect of the Dominion of Canada and the detailed regulations from time to time made thereunder for carrying such provisions into effect.

(2) The licensee shall operate the licensed apparatus in accordance with any regulations which may be issued from time to time by the Minister.

14. Except with the consent in writing of the Minister, the licensee shall not assign or sublet the licence.

15. The licensed apparatus at the said ship station shall be worked only by a person or persons holding a certificate or certificates issued by the Minister.

Certificates shall be granted to persons of such technical proficiency and shall be in such form and subject to such cinditions as the Minister may from time to time prescribe.

16. The licensee shall carry this licence on the ship on which the ship station is established under this licence, and also such documents as may be prescribed by the Minister, for the purpose of enabling the licensee to communicate with coast stations is accordance with the rules and regulations of the International Radiotelegraphic Convention of Berlin, 1906.

17. If, and whenever, in the opinion of the Minister or any officer in command of one of His Majesty's ships of war, an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for the said Minister or officer, by warrant under his hand, to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and, subject thereto, for such ordinary service as to the said Minister or officer may seem fit, and in that event, any person authorised by the said Minister or officer may enter upon the stations of the licensee and take possession thereof and use the same as aforesaid.

(2) The Minister or any officer in command of one of His Majesty's ships of war may when he considers such an emergency as aforesaid to have risen, instead of taking possession of the stations of the licensee, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus, either wholly or partly and in such manner as he may direct, and such persons may enter upon the licensee's premises accordingly, or the said Minister or officer may direct the licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said Minister or officer may prescribe, and the licensee shall obey and conform to all such directions.

(3) In any case such as aforesaid, if the licensee shows that during the exercise of any of the powers aforesaid, his receipts for the licensed apparatus with repect to which the said powers have been exercised have been less than his receipts from the same source during a corresponding period, the Government shall pay to the licensee, as compensation for any loss of profit sustained by the licensee by reason of the exercise by the Minister of any of the powers hereby reserved, such sum as may be settled between the Minister and the licensee by agreement or as in case of difference may be determined by arbitration. Provided always that no compensation as aforesaid shall be paid if not so far as the powers hereby reserved to the Minister are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and, save with the consent of the Minister no such compensation shall be paid if not so far as the powers aforesaid are exercised for the purpose of preventing direct or suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprehension of impending war.

18. In case of any breach, non-observance or non-performance by or on the part of the licensee of any of the terms or conditions herein contained and on the part of the licensee to be observed and performed, then and in any such case the Minister may, by writing, revoke and determine these presents and the licences, powers and authorities hereinbefore granted, and thereupon these presents, and the said licences, powers and authorities and each and every of them shall absolutely cease, determine and become void.

19. Nothing in these presents contained shall prejudice or affect the right of the Minister, from time to time, to establish, extend, maintain and work any system or systems of wireless telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Minister, from time to time, to enter into agreements for or to grant licences relative to the working and user of wireless telegraphs (whether of a like nature to those hereby licensed or otherwise) for the transmission of messages in any part of Canada, by mean of wireless telegraphy, with or to any person or persons whomsoever upon such terms as he shall, in his discretion, think fit.

20. Any notice, request or consent (whether expressed to be in writing or not) to be given by the Minister under these presents may be under the hand of any authorised officer for the time being of the Department of the Naval Service, and may be served by sending the same by registered letter to the licensee, and any notice to be given by the licensee, under these presents, may be served by sending the same by registered letter addressed to the Deputy Minister of the Naval Service, Ottawa, Ontario.

CEYLON.

A.—Ordinance No. 15 of 1914 (August 18th).

B.—Rules under this Ordinance.

WIRELESS Telegraphy in Ceylon and its territorial waters was originally legislated for under an Ordinance of 1903. In 1908 an Ordinance (No. 35) regulating Telegraphy in general was passed, which was afterwards extended to affect Wireless Telegraphy by an Amending Ordinance (No. 15), passed in 1914. This latter Ordinance, however, specifically cancelled a provision, contained in that of 1908, which provided for the continuance in force of the original 1903 enactment. The latter has, therefore, now been completely abrogated, and Wireless Telegraphy in Ceylon is regulated (*a*) by such clauses of the 1908 Ordinance as are applicable to Wireless Telegraphy; (*b*) by the Amending Ordinance (No. 15) of 1914; and (*c*) by the rules formulated under the provision of the latter Ordinance. We print below the apposite sections of Ordinance 15 of 1914 and the rules based upon it.

A Ordinance No. 15 of 1914 (modifying Ordinance No. 35 of 1908) and dated August 3rd, 1914, provides in its Clause 5 an amendment of Section 7 of the 1908 Ordinance. This prescribes the right of the Governor in Executive Council to "make rules, consistent with the Ordinance, for the conduct of all or any telegraphs

established, maintained, or worked by the Government or by persons licensed under this Ordinance." Rules under this section may provide for all or any of the following, amongst other matters, that is to say :—

(*a*) The rates at which, and the other conditions and restrictions subject to which, messages shall be transmitted.

(*b*) The precautions to be taken for preventing the improper interception or disclosure of messages.

(*c*) The period for which, and the conditions subject to which, telegrams and other documents belonging to, or being in the custody of, telegraph officers shall be preserved; and

(*d*) The fees to be charged for searching for telegrams and other documents in the custody of any telegraph officer.

(*e*) For prescribing the form and the manner in which applications for licenses under this Ordinance are to be made.

(*f*) For prescribing fees payable on the grant of any license.

(*g*) For regulating the manner in which an apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of Ceylon, shall be worked so as to prevent interference with naval signalling, or the working of any wireless telegraph or telephone station lawfully established, installed, or worked in Ceylon or the waters thereof, and so as not to interrupt or interfere with the transmission of any messages between wireless telegraph or telephone stations established as aforesaid on land and wireless telegraph or telephone stations established on ships at sea.

(*h*) For prohibiting, except with the special or general permission of the Postmaster-General of Ceylon, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, while such ship is in any of the harbours of Ceylon.

(*i*) For prohibiting or regulating, in case at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of Ceylon, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may deem fit to make from time to time, either in all cases, or in such cases as may be deemed desirable.

Moreover, Clause 6 of Ordinance No. 15 of 1914 adds to Clause 7 of the 1908 Ordinance a new sub-section lettered (2) A, which runs as follows :—

Provided that no regulations made in respect of the matters described in paragraphs (*g*), (*h*), and (*i*) or sub-section (2) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

* * * * * *

RULES.

The current rules, under which the Wireless Telegraphy is at present administered, were issued on December 3rd, 1914. They were based on Ordinance 15 of 1914 (see above) and run as follows :—

DECEMBER 3, 1914.

1. Any person desirous of obtaining a licence for the establishment of a wireless telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in the Colony, or on board any British ship registered in the Colony, must apply in writing to the Colonial Secretary. Such application must contain full particulars—

(*a*) Of the place or ship in respect of which a licence is sought;

(*b*) Of the nature of the apparatus which it is desired and proposed to instal and work; and

(*c*) Of the purposes for which the installation is intended to be utilised.

2. The following shall be the fees payable on the grant of licences :—

	Rs.
(*a*) For a licence for a land station	5
(*b*) For a licence for a ship station	5
(*c*) For an experimental licence	Free

3. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony, shall be worked in such a way as not to interfere with—

(*a*) Naval signalling; or

(*b*) The working of any wireless telegraph station lawfully established, installed, or worked in the Colony or in waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. In these regulations "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station, whether on shore or on any ship.

5. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour, port, or bay of the Colony, except with the special or general permission of the Postmaster-General.

6. (i.) If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, and notice to that effect is published by the Postmaster-General, after the publication of such notice and until further notice the use of wireless telegraphy on board merchant ships, whether British or foreign, whilst in the waters of the Colony, shall be subject to such rules as may be made by the Governor, and such rules may prohibit or regulate such use in all cases, or in such cases as may be deemed desirable.

(ii.) Such notice as aforesaid shall be published in the *Ceylon Government Gazette,* and in such other manner, if any, as to the Postmaster-General may seem fit.

7. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

8. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

9. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

CHINA

FOREIGN SETTLEMENTS.

(For Laws of the Republic see under "Chinese Republic.")

Hongkong

A—The Wireless Telegraphy Ordinance, 1913.

B—Regulations.

A THE following Ordinance (No. 20 of 1913) to provide for the regulation of Wireless Telegraphy was passed on July 24th, 1913, and repeals all previous Ordinances :—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. "Telegraph" means an electric, galvanic or magnetic telegraph and includes appliances and apparatus for transmitting or making telegraphic, telephonic or other communications by means of electricity, galvanism or magnetism.

The expression "Wireless Telegraphy" means any system of communication by "telegraph" (as defined in this Ordinance) without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: provided that nothing in this Ordinance shall prevent any person from making or using an electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may whenever he shall deem it expedient to do so license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4.—(1.) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2.) Every such licence shall be in such form and for such period as the Governor-in-Council may determine and shall contain such terms,

conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5.—(1.) If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Attorney-General.

(2.) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6.—(1.) The Governor-in-Council may make regulations for all or any of the following matters:—

(*a*) For prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(*b*) For prescribing the fees payable on the grant of any licence;

(*c*) For regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(*d*) For prohibiting, except with the special or general permission of the Colonial Secretary, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Colony;

(*e*) For prohibiting or regulating, in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that his Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2.) Provided that no regulations made in respect of the matters described in paragraphs (*c*), (*d*) and (*e*) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions, and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8.—(1.) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine of five hundred dollars.

(2.) All convictions, forfeitures, and fines under this Ordinance or any Regulations made thereunder may be had and recovered before a Magistrate.

9. The Wireless Telegraphy Ordinance, 1903, the Wireless Telegraphy Ordinance, 1909, and the Wireless Telegraphy Amendment Ordinance, 1909, are hereby repealed.

B THE following Regulations were made by the Officer Administering the Government in Council under the provisions of Section 6 of the Wireless Telegraphy Ordinance No. 20 of 1913), on November 20th, 1913 :—

1. Any person desirous of obtaining a licence for the establishment of a wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony, or on board any British ship registered in the Colony, must apply in writing to the Colonial Secretary. Such application must contain full particulars—
   (*a*) of the place or ship in respect of which a licence is sought,
   (*b*) of the nature of the apparatus which it is desired and proposed to instal and work, and
   (*c*) of the purposes for which the installation is intended to be utilised.

2. The following shall be the fees payable on the grant of licences :

(*a*) for a licence under Section 3 for a land station	$2.50
(*b*) for a licence under Section 3 for a ship station	$2.50
(*c*) for an experimental licence under Section 7	*Nil.*

3. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—
   (*a*) Naval signalling, or
   (*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission in writing of the Colonial Secretary of the Colony.

5. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that his Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. No proceedings shall be taken against any person under these Regulations except with the previous sanction of the Attorney-General.

Weihaiwei

No. 1 of 1904.

1. It shall not be lawful for any person to use or establish any apparatus or installation for the purpose of operating a wireless electric telegraph without a licence from the Commissioner on such terms and conditions as the Commissioner may from time to time prescribe.

2. Any person who commits any offence against the provisions of this Ordinance shall be liable to a fine not exceeding $500 or in default of payment thereof to imprisonment for a term not exceeding six months, with or without hard labour.

CHINESE REPUBLIC

WIRELESS Telegraphy in China is carried out under the "Telegraph Act" which was promulgated on the 16th April, 1915. As far as the handling of radiotelegrams is concerned, the Wireless Stations on the Chinese Coast are governed by the Regulations of the International Radiotelegraph Convention, 1912 (see pages 39-74) and the Service Regulations appertaining thereto. The entire charge for radiotelegrams is collected from the senders, and the accounts of the Chinese Coast Stations are settled with the Governments to which the ship stations are subject, or with the companies managing and controlling the Wireless Ship Stations.

At present radiotelegraphy in China awaits development, and the laws and regulations affecting the subject consist, therefore, of those formulated to govern the working of the ordinary wired telegraph and telephone, applied, as far as they are applicable, to radiotelegraphy. For this reason we present here a translation of the Chinese general regulations affecting all electrical means of communication, with a few comments emphasising the points which appear to affect wireless telegraphy.

INSTRUCTIONAL ORDER NO. 20.

Dated April 18th, in the fourth year of the Republic of China (*i.e.*, 1915).

Regulations Affecting Electrical Means of Communication.

Art. 1.—All telegraphs and telephones, whether wired or wireless, shall be included in the term "Electrical means of Communication."

Art. 2.—All electrical means of communication shall be owned and controlled by the State.

Art. 3.—The following electrical means of communication may be set up by private individuals or corporations after the sanction of the Government has been obtained :—

(*a*) Those established for the exclusive use of railways, mines or other specific and commercial enterprises.

(*b*) Those which are set up by individuals or corporations or Official Departments on their premises for the purpose of establishing connection with a public telegraph office for the convenience of the transaction of the business carried on by the said individuals or corporations.

(*c*) Those which are used by individuals, corporations, or official departments for intercommunication between various parts of the building in which they are located.

(*d*) Those which are used by ships *in transitu*.

(*e*) Those which are set up for the purpose of experiment or research.

(*f*) Telephones whose calling powers are to be confined within a certain définite area. These must not, however, be erected in any area which is at present furnished with telephonic communication. [*This clause appears to be one intended to apply to future telephone installations and not to any which may be at present erected. Of the above items it will be noted only (d) and (e) can apply to wireless telegraphy*.]

Art. 4.—The Government, in case of necessity, may in accordance with the provision of Laws and Edicts, seize all private electrical means of communication and convert them to public or military use. When, under the provision of this regulation, the Government so seize and make use of private owned electrical means of communication, it may appoint officials to take charge of and work them.

Art. 5.—When the Government consider it necessary in the interests and for the maintenance of public safety, they can restrict, suspend or cancel any use of electrical means of communication within certain prescribed areas.

Art. 6.—The Superintendent officials at telegraph offices controlled by the Government may suspend the transmission of any message or refuse altogether to accept it, when they consider its contents to be opposed to public safety.

Art. 7.—When special circumstances or *force majeur* cause telegrams to be delayed in transmission or prevent their transmission, the senders cannot claim compensation for damage arising from such delay or hindrance.

Art. 8.—Correspondents are themselves responsible for the contents of their messages.

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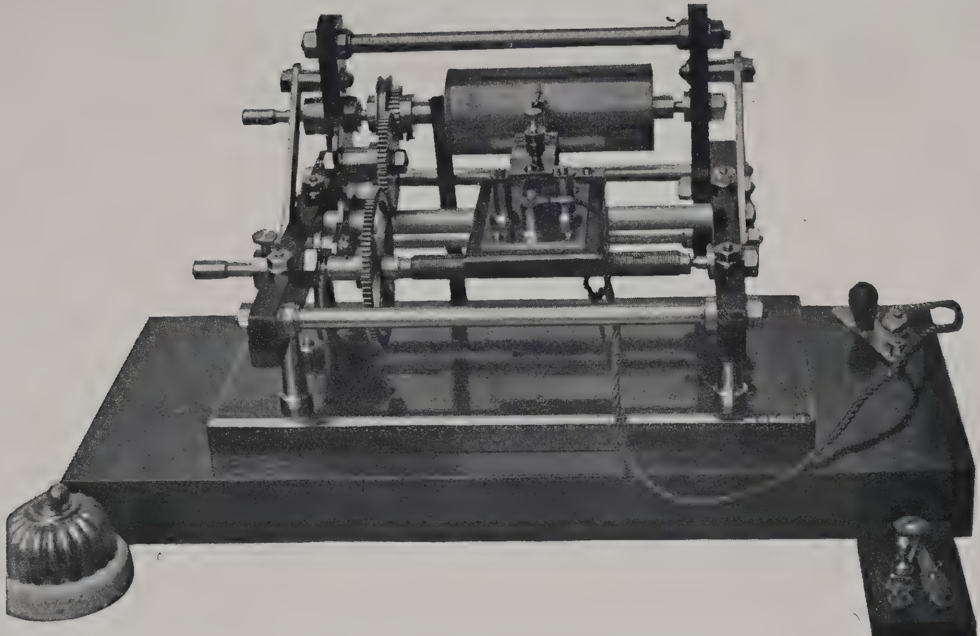


GENERAL VIEW OF APPARATUS FOR THE WIRELESS TRANSMISSION OF PHOTOGRAPHY.

ART. 9.—With regard to the transmission of telegrams or telephone messages no exemption with regard to liability or responsibility can be entertained on the ground of mental deficiency on the part of the sender.

ART. 10.—Telegrams received at public telegraph offices—other than those specified by Government orders—will be delivered in accordance with the addresses given by the sender. If, owing to the fact that the address given is incorrect or insufficient, the telegram cannot be delivered, this fact will be publicly announced, and if no application for the message is received within 42 days from the date of the public announcement, the said message will be destroyed.

ART. 11.—When messages are received in secret code, or in obscure or metaphorical language, the telegraph officials may, if they think fit, call upon the sender to translate the code or elucidate the meaning of the message. If the sender refuses to de-code or explain, or, in complying with this request, fails to put the telegraph official truthfully in possession of the real meaning of the message, the official may stop the transmission of the said message.

ART. 12.—Officials, workmen, or messengers engaged in the performance of their duty in connection with telegraphs or telephones are not to be interfered with or stopped by the authorities of the customs or by those operating the canal locks.

ART. 13.—Officials, workmen, or messengers when proceeding in discharge of their official functions are to be allowed unhindered transit over building-land, and fields (with the exception of those enclosed by walls and gateways) whenever there may be any hindrance to their transit through the regular streets or paths. But if the passage of such Officials, workmen, or messengers causes damage to be done to buildings, or to crops in cultivated property, the Government will pay adequate compensation on the application of the owner and on his proof of such damage.

ART. 14.—When officials, workmen, or messengers engaged in performing their official functions ask for help or assistance in order to overcome any special hindrance in transit, or when they ask for assistance in climbing mountains or crossing rivers, the persons to whom such request is made may not refuse such help or assistance without assigning adequate reason for so doing. But in the event of such assistance being rendered, the Government will give the person rendering it fit and proper remuneration for such aid and assistance, on his application for such remuneration.

ART. 15.—Telegraph or Telephone wires may be set up at convenient places, no matter through what property it is necessary for them to pass; but if their erection involves an encroachment on the rights of others, whether private individuals or corporations, the Government will, on application, allot adequate compensation for such encroachment.

ART. 16.—Charges for telegrams and telephone messages shall be collected in cash according to fixed rates.

ART. 17.—Materials used for the purposes of Telegraph and Telephone Services shall be exempted from tax, but not from Customs Duties.

ART. 18.—With reference to the compensation for damage caused, and the right of application for remuneration referred to in the above clauses in connection with the carrying out of Electrical Means of Communication, the period within which such right to compensation or remuneration may be dealt with, and the manner in which it may be so dealt with and adjudicated, shall be regulated by separate "Instructional Orders."

ART. 19.—Any who may offend against Articles 2, 3, 4, 12, 13, and 14 shall be liable to a fine of from 5 to 200 dollars. Those who offend against Articles 2 and 3 shall, in addition to fines, be liable to confiscation of poles, wires, machines or other apparatus.

ART. 20.—The conditions laid down in Articles 12-19 shall not be applicable to private electrical means of communication, but the specially authorised telephones erected under section (*f*) or Article 3 may adopt the regulation comprised in Article 16.

ART. 21.—All Laws, Orders or Treaties affecting telegrams between China and Foreign Countries shall have their respective provisions observed and the provisions of this Instructional Order shall not be held to modify or abrogate them.

ART. 22.—These regulations shall come into force immediately on the date of their promulgation.

CURACOA

See under Netherlands.

DENMARK

A—Act 99 of 1907.

B—Rules dated July, 1913.

A THE regulations affecting Wireless Telegraphy in Denmark are based upon ACT No. 99 of APRIL 19TH, 1907, the text of which runs as follows:—

1. The Government shall have the sole right to erect and operate wireless telegraphs (radiotelegraphs) within the Danish boundaries and maritime territory.

2. Telegraph stations on board ships under foreign flag must only be utilised on Danish maritime territory when following the regulations to be drawn up in this respect by the Minister for Public Works. The Minister may prohibit every kind of telegraphic communication from such stations and take the necesary measures to carry through such prohibition, when in his opinion circumstances require it.

3. On board ships under Danish flag, not owned by the Government, telegraph stations must only be fitted and operated both on and outside Danish maritime territory according to licence previously obtained from the Minister of Public Works. In case the conditions concerning the fitting and working of the station stipulated in the licence are not maintained, the Minister may cancel the licence.

In case it is desired that the working of stations being in operation at the time when the Act comes into force, should be continued, an application to that effect must be filed with the Minister for Public Works not later than four weeks after the Act has come into force,

the Minister having then to decide whether and on what conditions the operation of the station may be continued.

4. Scientific and technical trials with wireless telegraphy must be made by no others than the State Authorities unless permission to that effect has been previously obtained from the Minister for Public Works.

5. The regulations stipulated in Act No. 84 of May 11th, 1897, Art. 17, concerning the duty as to secrecy incumbent on the officers and functionaries of the Telegraph Department and concerning the punishment they may be subjected to in the case of a breach of the aforesaid duty, should also be applicable to wireless operators. The regulations stipulate in Art. 18 of the same Act concerning corresponding regulations for employers of private companies may also be made applicable towards operators on board ships.

6. Any contravention of the regulations given in Articles 1-4 shall be punished, provided that the circumstances concerned according to their nature do not inflict a more serious punishment, with forfeiture of the apparatus unlawfully placed and utilised. Furthermore, the contravening person may be liable to a fine of up to 400 kroner, which fine shall devolve to the Treasury. Such contraventions shall be dealt with in the same way as public police cases. The Minister for Public Works shall be the only person entitled to institute proceedings against contraveners of this Act.

* * * * * *

The following regulations became effective on July 1st, 1913 :—

REGULATIONS.

B In accordance with Act No. 99 of April 19th, 1907, concerning wireless telegraphs (radiotelegraphs) and the International Convention concerning radiotelegraphs drawn up in London, on July 5th, 1912, supplemented by appendix decisions, finishing protocol and service regulations, the following decisions shall be observed in founding and working of radiotelegraph stations and in the handling of radiotelegrams :—

I.—Establishing of Radiotelegraph Stations.

1. On Danish soil and on board ships permanently anchored, such as lightships, etc., radiotelegraph stations (coast stations) can only be established by the Government.

2. On board ships under Danish flag, not owned by the Government, radiotelegraph stations (ship stations) may only be established and operated after permission has been previously obtained from the Department of Public Works.

The licence or a certified duplicate of it must always be kept on board the ship.

The licence may be withdrawn if the conditions for the fitting and operation of the station, set out therein, are not complied with; in such cases the entire apparatus belonging to the station must be removed.

3. Applications for licences to establish and operate radiotelegraph stations on board ships sailing under the Danish flag must be drawn up on forms approved of by the Department of Public Works, delivered and sent in duplicate to the Telegraph Department, and must be supplied with an endorsement to the effect that the station will fulfil the following conditions :—

(*a*) The waves transmitted must be as pure and as little damped as possible; the utilisation of transmitting apparatus, by

which the transmitted waves are generated by a direct sparking discharge in the antenna, especially, is only permissible in case of need. This latter arrangement of the transmitter may, however, be permitted in the case of certain special stations (as, for instance, on board small vessels), the primary energy of which does not exceed 50 watt.

(*b*) The speed of transmission and reception must be no less than twenty words a minute, the word to consist of five letters. New installations utilising an energy of more than 50 watt must be fitted in such a way as to make it easy to obtain more telegraph distances, smaller than the normal ones, the smallest of which should be about 15 nautical miles (equal about 28 km.). Old installations utilising an energy of more than 50 watt must be altered, if possible, so as to comply with the regulations mentioned above.

(*c*) The receiving apparatus, protected in the best possible way against disturbances, must be able to receive signals with the wave lengths of up to 600 m., which are stipulated for the ship station.

(*d*) The primary energy of the station measured across the generator must under no circumstances exceed 1 k.w.

(*e*) Larger energy than 1 k.w. may, however, be utilised, if the ship is to interchange telegrams over a distance of more than 200 nautical miles (equal 370 km.) with the nearest station, or if communication, due to interference is not obtained unless by an increase of the transmitting energy.

(*f*) The station must be operated by one or more operators who have obtained certificates as specified below in Section 7.

The station must not be opened for communication until the telegraph department has issued a certificate, which will not be granted until the department, by inspection, is satisfied that the conditions set out in the licence granted by the Department of Public Works have been fulfilled.

II.—Installation, Service and Operation of Private Ships' Stations.

4. The apparatus of ship stations must at any time be in strict accordance with the conditions set out in the licence for their establishment.

5. The hours of service of each coast station are decided by the Government Department.

As far as the hours of service of ship stations are concerned, these stations are divided into the following three classes:—

(1) Stations with continuous hours of service.

(2) Stations with limited hours of service; and

(3) Stations with no fixed hours of service.

During navigation stations with continuous hours of service must be attended to constantly at the aural apparatus. In the case of stations with limited hours of service the aural apparatus must be attended to during all of the hours of service as well as during the first ten minutes of each hour not comprised in the normal hours of service. Stations with no fixed hours of service are not obliged to keep any regular watch over the aural apparatus.

The classification of a ship as regards the hours of service of same shall be stated in the licence.

6. Any ship station must be fitted to utilise wave lengths of 600 m. and 300 m. respectively. The normal wave length is 600 m. Small ships may, however, be allowed to utilise wave lengths of 300 m.; but they must always be able to receive telegrams with a wave length of 600 m. During the hours of service each ship station must be capable of being called with its normal wave length.

Ship stations maintaining continuous watch and ship stations with limited hours of service shall be bound to have a radiotelegraphic spare installation, the single parts of which must be placed as safely as possible. This installation must have a source of energy of its own and must be capable of being put into use quickly, must be able to work satisfactorily for at least six hours and must have a minimal range of :—

80 nautical miles (equal about 150 km.) for ship stations belonging to the first class (maintaining continuous watch).

50 nautical miles (equal about 100 km.) for ship stations belonging to the second class (with limited hours of service).

This special installation is not required in the case of ships, the normal installations of which comply with the requirements of spare installations mentioned above.

7. The service of the ship station must be maintained by operators who are in possession of certificates granted by the Department of Public Works.

In cases of urgent necessity and durnig one voyage only the service of a ship station may be undertaken by one or more operators holding a certificate from a foreign Government, which Government has joined the International Convention concerning radiotelegraphs.

The certificate shall certify :—

Partly the ability of the operator :

(*a*) In the maintenance of the apparatus and knowledge of their working.

(*b*) In the sending and receiving (by sounding) of telegrams with a speed :

(1) No less than twenty words a minute for obtaining a certificate of first class, and

(2) No less than twelve words a minute for obtaining a certificate of second class.

(*c*) In the knowledge of the regulations utilised, governing radiotelegraph service.

Partly that the operator shall be bound to secrecy and subject to penalty, etc., for a breach of this condition as in the case of State telegraph operators.

Operators holding a certificate of second class may do service :—

(*a*) On board ships utilising radiotelegraph in their own service or for the correspondence of the crew only.

(*b*) As assistant operators on board all ships having at least one operator holding a certificate of first class.

Ship stations with continuous service must be operated by at least two operators holding a certificate of first class.

The radiotelegraph service of the ship stations is placed direct under the master of the ship concerned.

In the event of a contravention of the regulations governing the operation of the radiotelegraph service, the certificate may be cancelled by the Department of Public Works.

No unauthorised person must be allowed to enter the wireless cabin.

8. If technically possible, ship stations must interchange telegrams with other stations (coast or ship stations), without regard to the system of radiotelegraphy employed at the station concerned. The interchange of telegrams with other ship stations must, however, be so arranged that the working of coast stations is not interfered with, these as a rule having the priority in public telegraph service.

The operation of a station must as far as possible be arranged so that it does not interfere with other stations.

Exchange of superfluous signals and words is prohibited. Experiments and practice shall only be permitted in so far as the service of other stations is not interfered with; therefore, they must be executed with no other wave lengths than those utilised in the case of public telegram exchange, and utilising as little energy as possible.

When a ship is in a Danish harbour her station must only be utilised for communication with ships in distress.

9. According to the London Convention, the Telegraph Department must notify the Berne Bureau of the ship installation, and the Telegraph Department can demand to be furnished with any information regarding the installation, service, and working of a ship station, both for this and for other purposes.

10. The Telegraph Department will see that all conditions for the fitting and operation of ship stations are complied with. The inspectors for this purpose, who are selected by the Director of Telegraphs, must at any time on showing their authority be admitted to inspect and test the station, provided that the ship is within Danish waters. All information required by the said inspectors must be immediately given, and their directions must be complied with, pending the decision of the Director of Telegraphs, or, that of the Department of Public Works.

For the proper carrying out of the inspection the inspectors shall be paid a daily remuneration in addition to travelling expenses; such amount shall be paid by the Telegraph Department, but will have to be refunded (on demand) by the owners of the ship in question.

III.—Handling of Radiotelegrams.

11. Radiotelegraph stations open for public service for the transmission and reception of telegrams may be used by any person, unless the public telegram exchange at the station in question is limited to a certain special kind of telegrams (see section 14).

The telegrams are divided into three classes:—

(1) State telegrams.

(2) Service telegrams.

(3) Private telegrams.

The right to transmit State telegrams and service telegrams, and

the right to priority for such messages, is at any time governed by the provisions embodied in the International Telegraph Regulation and the Inland Telegraph Regulation governing the transmission of such telegrams over ordinary telegraph systems.

12. Regarding the radiotelegraph traffic, the handling of telegrams is governed by the International Radiotelegraph Service Regulation, Articles XIV-XV, XIX-XL, XLV-XLIX. The handling of telegrams to and from coast stations and over the ordinary telegraph and telephone system is at any time governed by the Inland and International regulations for such traffic.

13. State and service telegrams may under all conditions be written in code or cypher. Private telegrams in code or cypher may be interchanged only with coast stations of such countries where this method of communication is allowed.

14. The ship stations may be licensed for :—

Ordinary public telegraph communication.

Limited public telegraph communication (with specified ships, with specified shipping lines, etc.)

Private telegraph communication.

Special telegraph communication (exclusively for State use, etc.)

In the public telegraph commnuication the following special radiotelegrams are to be received and handled :—

(1) Radiotelegrams with prepaid reply.

(2) ,, (collated telegrams)

(3) ,, to be delivered by express messenger.

(4) ,, to be delivered by post.

(5) ,, with more addresses than one

(6) ,, with certificate of arrival. Certificates of arrival are handled on lines of telegraphs only.

(7) Paid service messages, except such as require a repetition or an information.

(8) Express telegrams, which are, however, only transmitted as such on the ordinary lines of telegraphs and under the proviso that the prescriptions of the International Telegraph Regulations are followed.

All stations are bound to receive, answer, and, if possible, further to communicate messages from ships in distress and give these absolute priority.

Ship stations, however, have no responsibility whatever regarding the radiotelegraph communication.

Ship stations intended for public telegraph service shall get such printed forms, service journals, tariff lists, etc., as are necessary for this service, from the Telegraph Department against payment of fixed amounts. It is the duty of the station to take care that a sufficient supply of these things is always available. Such stations must furthermore be governed by all the instructions regarding the installation and operation of the station and the handling of the traffic issued by the Telegraph Department.

15. The abbreviations mentioned below covering the terms also mentioned below may be utilised; they are written between two double hyphens before the address, and are charged as one word:—

To be delivered to addressee only	MP
Delivered open	Ouvert
Private express telegram	Urgent or D
x Addresses	TMx
Reply paid x	RPx
Urgent reply paid x	RPDx
Collation	TC
To be delivered per post	Poste
Télégraphe restant	TR
Poste restante	GP
Post registered	PR
Poste restante registered	GPR
Telegraphic certificate of arrival	PC
Telegraphic urgent certificate of arrival ...	PCD
Certificate of arrival by post	PCP
Express messenger	Exprès
All addresses to be stated	CTA

16. The entire charge for radiotelegrams shall include:—

(1) Charge for the radiotelegraphic handling, namely:

(*a*) "Coast fee," which shall devolve on the coast station.

(*b*) "Ship fee," which shall devolve on the ship station.

(c) "Transit fee," for the coast or ship stations being intermediary stations at the handling of the telegrams.

(2) Charge for handling over the ordinary telegraph and telephone system paid according to the general regulations.

The coast fee for Danish coast stations shall be 15 ctm. per word.

The ship fee shall be fixed by the owner of the ship station, subject to the approval of the Department of Public Works. It must not exceed 40 ctm. per word; a minimum charge per telegram may, however, be adopted, not exceeding the charge for ten words. Service telegrams concerning the radiotelegraph service are handled without any charge. Service telegrams concerning telegrams handled exclusively per radiotelegraph are handled without any charge between the radiotelegraph stations, but are liable to charge when passing lines of telegraphs. Press telegrams at a reduced charge will not be received.

17. The entire charge for the handling of a radiotelegram from the sender to the addressee is to be collected from the sender by the station where it originates. The stations must not collect larger amounts than allowed in the tariffs.

18. All pecuniary liability in consequence of the operation of the ship stations is payable entirely by the owners of the ship in question, without regard to whether the liability in any case may have been due to fault or neglect on the part of the operators.

19. The original radiotelegrams with the vouchers pertaining thereto

must, if possible, be sent once a month by the ship stations to the Telegraph Department.

20. Reimbursement of charges paid, and accounts with the Telegraph Department, are governed by the International Radiotelegraph Service Regulation, Articles XLI and XLII.

IV.—OTHER REGULATIONS.

21. Stations on board ships under foreign flags must not be operated during the time such ships are in a Danish harbour, except to receive, answer and forward messages from ships in distress.

22. When the interests of the State require it, the Government may reserve to itself the right to prohibit all radiotelegraphic commnuications from ships, Danish or foreign, in Danish waters, and to make the necessary regulations to carry through such prohibition.

23. The maximum penalty payable to the State by the owners or radiotelegraphic company concerned for contravening the foregoing regulations is 400 kroner (£22), and all unlawfully fitted or utilised apparatus may be forfeited. Such contraventions are dealt with in the public police court, and proceedings may only be taken according to demand by the Minister for Public Works.

24. These regulations shall come into force on July 1st, 1913.

DUTCH EAST INDIES

See under Netherlands.

EAST AFRICA PROTECTORATE

THIS Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. The expression "wireless telegraphy" means any system of communication by telegraph as defined by the Indian Telegraph Act, 1883, without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Protectorate or on board any British ship registered in the Protectorate.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Protectorate or on board any British ship registered in the Protectorate except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand and five hundred rupees or to imprisonment of either description for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Attorney-General.

(2) If a Magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor may make regulations for all or any of the following matters:—

(*i.*) for prescribing the form and manner in which applications for licences under this Ordnance are to be made;

(*ii.*) for prescribing the fees payable on the grant of any licence;

(*iii.*) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Protectorate shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed or worked in the Protectorate or the waters thereof and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(*iv.*) for prohibiting, except with the special or general permission of the Postmaster-General of the Protectorate, the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Protectorate;

(*v.*) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Protectorate, the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (*iii.*) (*iv.*) and (*v.*) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder or in breach of the conditions and restrictions subject to or upon which any licence has been issued shall be deemed to be an offence against this Ordinance and for every such offence not otherwise specially provided for the offender shall in addition to the forfeiture of any articles seized be liable to a fine of seven hundred and fifty rupees.

(2) All convictions, forfeitures and fines under this Ordinance or any Regulations thereunder may be had and recovered before a Magistrate of the first class, and every such Magistrate shall have jurisdiction to pass any sentence authorised by this Ordinance on any European or other Non-Native convicted of an offence against this Ordinance notwithstanding anything in any Ordinance or law limiting the jurisdiction of such Magistrate over Europeans and Non-Natives.

9. The Wireless Telegraphy Ordinance, 1908, is hereby repealed: Provided however—

(1) Every licence granted under the said Ordinance and in force at the commencement of this Ordinance shall be deemed to have been granted under this Ordinance.

(2) All Regulations made under the said Ordinance and in force at the commencement of this Ordinance shall be deemed to have been made under this Ordinance and shall continue in force until other provision is made.

EGYPT

WIRELESS Telegraphy is a State monopoly in Egypt in accordance with the following Khedivial Decree dated May 12th, 1906:—

1. Wireless Telegraphy shall be a State monopoly and no installation shall be established or used except by the Government or with the sanction of the Government.

2. The Minister of Public Works shall be responsible for administration of this law.

Sudan

The Regulations affecting Radiotelegraphy in the Sudan are carried out under an Ordinance issued by Sir Reginald Wingate, the Governor-General, and dated at Khartoum, June 4th, 1906. It runs as follows:—

AN ORDINANCE FOR CONSTITUTING WIRELESS TELEGRAPHY A MONOPOLY OF GOVERNMENT.

No. 2 of 1906.

"This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1906.

"No person shall instal or make use of any apparatus for Wireless Telegraphy or transmit or receive messages by means of any such apparatus with the Sudan except the Department of Telegraphs or a duly authorised officer or official of the Sudan Government, unless such person is in possession of a special licence in writing from the Governor-General."

FALKLAND ISLANDS

THE following Ordinance relating to wireless telegraphy came into force on March 15th, 1912:—

1. No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor in Council.

2. No person shall work any apparatus for wireless telegraphy installed on any merchant ship (whether British or foreign) whilst that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made in that behalf by the Governor in Council, and the Governor in Council may, by any such regulations, impose penalties, recoverable before a Stipendiary magistrate or any two Justices of the Peace in a summary manner, for the breach of any such regulations, not exceeding twenty pounds for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship.

3. If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be guilty of a misdemeanour and be liable on summary conviction thereof to a penalty not exceeding twenty pounds or to imprisonment not exceeding three months, and, on conviction in the Supreme Court, to a fine not exceeding one hundred pounds, or to imprisonment for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence.

4. If a Justice of the Peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship within his jurisdiction without a licence in that behalf or contrary to the provisions of the regulations made under this Ordinance, he may grant a search warrant to any constable or to any officer appointed in that behalf by the Governor and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

5. The expression "wireless telegraphy" means any communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

6. The Wireless Telegraphy Ordinance, 1903, is hereby repealed.

7. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1912.

FIJI.

A—Ordinance of December 24th, 1912.
B—Regulations.

THE Fijian Islands are linked with each other, and also connect Tutuila and Apia in the Samoan Group with the telegraph systems of the world by means of wireless telegraphy. The first Regulations passed governing the administration of the radio services of this British Colony were contained in the "Ordinance of 1903." This was revoked by Ordinance No. XXVI. of 1912.

AN ORDINANCE TO GOVERN THE USE OF WIRELESS TELEGRAPHY IN THE COLONY.

24th December, 1912.

A Be it enacted by the Governor, with the advice and consent of the Legislative Council, as follows:—

1. This Ordinance may be cited for all purposes as the Wireless Telegraphy Ordinance 1912.

2. The Wireless Telegraphy Ordinance 1903 is hereby repealed.

3. (1) It shall not be lawful for any person to establish, install, or use in the Colony any apparatus for the purpose of electrical communication by means of wireless telegraphy without a license to do so first obtained from the Governor.

(2) A license under this section shall be subject to such terms and conditions as may be prescribed by any regulations made under this Ordinance and to such other terms and conditions as the Governor may from to time think fit to prescribe.

4. The Governor may make regulations from time to time to carry out the provisions of this Ordinance and in particular to regulate the use of apparatus for wireless telegraphy on board merchant ships, whether British or Foreign vessels, while in the territorial waters of the Colony.

5. Any person who contravenes the provisions of this Ordinance or of any regulation made hereunder or fails to observe or perform the terms of a license granted by the Governor hereunder or prescribed by any regulation aforesaid shall be liable to a penalty not exceeding one hundred pounds and to the forfeiture of any apparatus established, installed, or used for the purpose aforementioned.

Passed in Council this nineteenth day of December in the year of our Lord one thousand nine hundred and twelve.

The above Ordinance (No. XXVI) was further elucidated and supplemented by Regulations made by the Governor under the provisions of Section 4 of the said Act.

REGULATIONS

MADE BY THE GOVERNOR UNDER THE PROVISIONS OF SECTION 4 OF THE WIRELESS TELEGRAPHY ORDINANCE 1912.

B 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with—

(*a*) naval signalling ; and

(*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof ;

and in particular the said apparatus shall be so worked as not to interrupt, or interfere with, the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

Permission of Colonial Postmaster required to working of wireless apparatus on merchant ships in harbours of the Colony.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission of the Colonial Postmaster.

Government to have control in emergency.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in territorial waters aforesaid shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate that use in all cases or in such cases as may be deemed desirable.

4. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

* * * * * *

REMARKS.

These Regulations (and *ipso facto* the Act of 1912 under which they were made) received His Majesty's approval, as announced by the Governor in the following terms, dated *Colonial Secretary's Office,* Suva, Fiji, 1st October 1913 :—

His Excellency the Governor has been informed by the Right Honourable the Secretary of State for the Colonies that His Majesty the King will not be advised to exercise his power of disallowance in respect of the following Ordinance :—

Ordinance No. V. of 1913, entitled An Ordinance to provide for the Regulation of Wireless Telegraphy.

* * * * * *

There is also issued *by Authority* in the Colony of Fiji a pamphlet entitled "Telegraph Information and Regulations," dated 1913, which—over and above general telegraphic information—contains the rates and specific conditions affecting Wireless Telegraphy.

FRANCE

(Including Algeria and Tunis.)

THE commercial use of wireless telegraphy in France, Algeria, and Tunis is under the control of the Minister of Commerce, Industry and Post and Telegraphs. The Department of Telegraphs deals with all matters relating to the administration of commercial wireless telegraphy, and this Department also controls inland and foreign telegraphs. The Ministry of War and the Ministry of Marine control the use of wireless telegraphy in the Army and Navy.

With regard to the other French Colonies, the service in each is organised under a decree of the respective Governors of those Colonies.

Through the courtesy of the French Government we are able to append a general note affecting radiotelegraphy in these Colonies, which will be found at the end of this section.

There have been no recent changes in the Laws and Regulations relating to wireless telegraphy, with the exception of the special regulations made in consequence of war. These regulations, however, have not been published.

The following are the principal clauses of the Decree dated March 5th, 1907 (modified by the following decrees: April 26th, 1910; February 5th, 1911; May 27th, 1911; November 20th, 1911), which superseded the decrees of February, 1903, and February 27th, 1904:—

1. Radiotelegraphic stations established or about to be established in France, Algeria and Tunis shall be classified as follows:—

(*a*) Coast or internal land stations for carrying on commercial service.

(*b*) Naval coast stations.

(*c*) Military coast stations.

(*d*) Lighthouse or lightship stations.

In addition, private stations may be established temporarily when the necessary licences have been obtained.

2. The President of the Council, the Ministries of the Interior, of Public Works, Posts and Telegraphs, of War, Marine, Colonies, Foreign Affairs, Commerce and Industry, Public Instruction and Fine Arts are charged, in so far as concerns their respective departments, with the carrying out of this Decree.

In case of mobilisation the Ministries of Marine and War shall automatically assume control of all stations, without exception.

3. The choice of sites for the proposed range of a station and all technical conditions applicable to each projected station shall be submitted for the consideration of an Inter-ministerial Commission formed in accordance with Article 4 of this Decree. The function of this Commission is to study the various aspects of the services to be carried on and to indicate to the Administrative Departments affected the conditions that are necessary to reconcile their respective interests.

4. The Inter-ministerial Technical Commission shall be appointed by the Minister of Public Works, Posts and Telegraphs, and shall comprise the following members:—

One President and one Vice-President appointed by Presidential decree from the Departments interested.

Three representatives from the Ministry of Marine.

Three representatives from the Ministry of War.

Two representatives from the Colonial Office.

Two representatives from the Foreign Office.

Two representatives from the Ministry of Commerce and Industry.

Two representatives from the Ministry of Public Instruction and Fine Arts.

One representative from the Ministry of the Interior.

Four representatives from the Ministry of Public Works, Posts and Telegraphs, one representing the Department of Public Works and three the Post and Telegraph Administration.

A secretary who shall belong to the Post and Telegraph Administration. He shall have no voting powers.

5. The Commission shall examine the title to sites and technical conditions appertaining to all stations which shall constitute the French radiotelegraphic network; examine complaints regarding French stations; consider such administrative problems concerning the radiotelegraphic service as the Ministry of Public Works, Posts and Telegraphs deems fit to submit to it; institute experiments of general interest. The Commission shall be informed through the departments represented thereon of results obtained by various types of apparatus employed at stations in operation.

6. Except during periods of mobilisation all radiotelegraphic coast stations and stations carrying on commercial services, other than those which exist solely for experimental purposes, shall be open for the transmission of private telegrams.

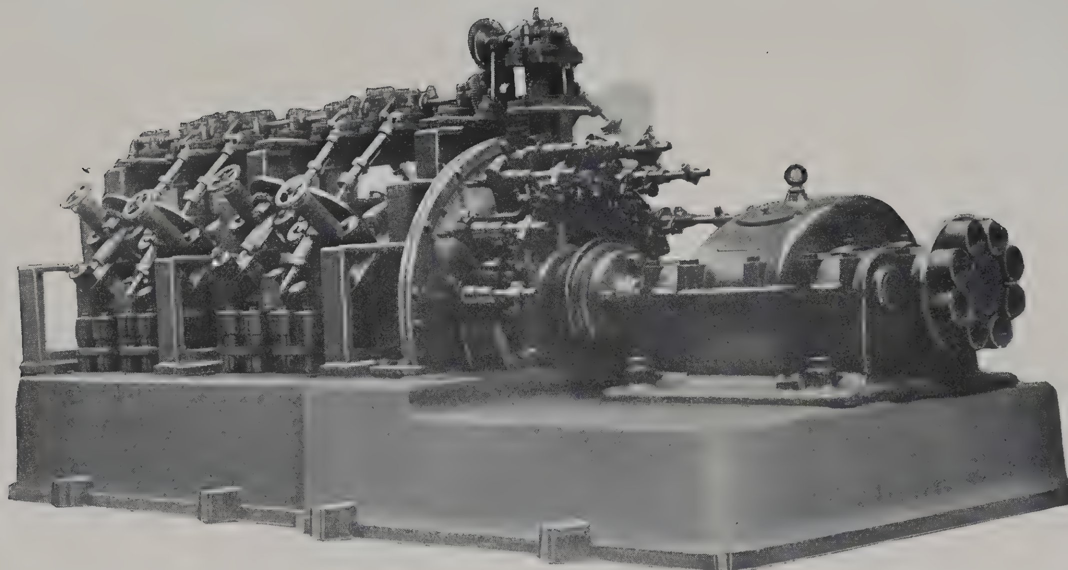
7. The Post and Telegraph Administration shall be responsible for all matters concerning the collection of taxes, foreign stations, and the International Bureau at Berne. It shall supervise the administration of international regulations in so far as they concern commercial traffic passing through coast stations in France, Algeria and Tunis, as well as through stations on vessels of the mercantile marine.

8. Licences to establish private stations shall be granted by the Post and Telegraph Administration upon the recommendation of the Commission referred to in Article 4. Such licences shall only be of a temporary character, and the stations are strictly forbidden to interfere with the working of other stations.

COLONIES OF FRANCE.

(*Not* including Algeria and Tunis.)

The local systems of these Colonies are organised and regulated by their Governor-Generals and the other Administrators affected. Co-ordination in working is secured through the intermediary of the French Colonial Office (Secretarial and Counter-Signatory Departments), to which is attached a Special Committee, entitled the Colonial Committee of Radiotelegraphy, whose business it is to advise on all matters of general concern.



TIMED SPARK DISC DISCHARGER, FOR CONTINUOUS WAVE PRODUCTION FOR HIGH-POWER STATIONS.

[To face page 208.

Since the beginning of the war, the French Colonies have instituted a new radiotelegraphic station at Tahiti (Papeete-Mahina) for communication with ships, with New Zealand, the Samoan Islands and the Hawaiian Islands. There is also a new installation in New Caledonia (Noumea). The latter is intended for ship communication primarily; but, in case of cable breakdown, it can communicate with Australia. There must be added to the above a new installation in Annam (Tourane) for ship communication.

The radio establishments at Atar and Chinguetti in Mauritania (French West Africa) have been opened for public service and communicate with Senegal by means of relays through Port-Etienne and Rufisque.

GAMBIA

A.—Ordinance, September 22nd, 1913.
B.—Schedule.
C.—Rules.

THE rules governing the working of wireless telegraphy in this Colony were originally instituted under the Ordinance (Maintenance of Control) of 12th February, 1903. This has now been repealed and the ruling Ordinance is that of the 22nd September, 1913, entitled "An Ordinance to provide for the Regulation of Telegraphs." The text thereof runs as follows :—

A I. This Ordinance may be cited as "The Telegraphs Ordinance, 1913."

II. The words "telegraphy" and "telegraph" mean any system used for conveying, transmitting or distributing electricity or any like agent for the purpose of communication from one point to another.

The expression "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

III. The Governor may, whenever he shall deem it expedient to do so, license the establishment of any telegraph station, or the installation or working of any apparatus for wireless telegraphy, in any place in the Colony or Protectorate or on board any British ship registered in the Colony.

IV. (1) No person shall establish any telegraph station, or instal or work any apparatus for wireless telegraphy, in any place in the Colony or Protectorate or on board any British ship registered in the Colony except under, and in accordance with, a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form, and for such period, as the Governor in Council may determine and shall contain such terms conditions and restrictions on, and subject to, which the licence is granted as the Governor shall consider desirable in the public interest.

V. (1) If any person establishes a telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a

fine not exceeding one hundred pounds or to imprisonment with or without hard labour for a term not exceeding twelve months and in either case be liable to forfeit any apparatus for telegraphy installed or worked without a licence; but no proceedings shall be taken against any person under this section except with the sanction of the Legal Adviser to the Governor.

(2) If the Chief Magistrate, the Police Magistrate or a Justice of the Peace is satisfied by information on oath that there is reasonable ground for believing that a telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf, he may grant a search warrant to any Police Officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used, or intended to be used, for telegraphy therein.

VI. (1) The Governor-in-Council may amend, vary or revoke any of the regulations contained in the Schedule to this Ordinance, and may make regulations for all or any of the following matters :—

(i) prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(ii) prescribing the fees payable on the grant of any licence;

(iii) prohibiting or regulating the use of telegraphy in such telegraph stations, or of wireless telegraphy on board such ships while in such waters, by such further rules as the Governor-in-Council may see fit to make from time to time, and either in all cases or in such cases as may be deemed desirable, if at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over telegraph stations or over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony.

(2) Provided that no regulations made in respect of the provisions in this section contained shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

VII. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

VIII. (1) Every omission or neglect to comply with, and every act done or attempted to be done contrary to the provisions of this Ordinance or of any regulation made thereunder, or in breach of the conditions and restrictions subject to, or upon, which any licence has been issued shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine not exceeding fifty pounds or to imprisonment with or without hard labour for a term not exceeding six months.

(2) All convictions forfeitures and fines under this Ordinance or

any regulations made thereunder may be had and recovered before a Court of Petty Sessions.

IX. Nothing in this Ordinance contained shall invalidate or impair any agreement now in force entered into between the Governor of this Colony, or the Imperial Government on behalf of the Government of this Colony, and any Telegraph Company, relative to the laying down or landing of any telegraphic cable, the removal, renewal, maintenance and use thereof, or to the payment of any subsidy to such company by the Government of this Colony or any other the like matter.

X. Nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

XI. The Telegraphic Establishments (Maintenance of Control) Ordinance 1903 is hereby repealed.

* * * * * *

To this Ordinance is attached a Schedule which runs :—

THE SCHEDULE.

B "1. All apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the territorial waters of the Colony shall be worked in such a way as not to interfere with (*a*) naval signalling, or (*b*) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, or in the Protectorate, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, shall be worked or used whilst such ship is in any of the harbours of the Colony or Protectorate except with the special or general permission of the Governor.

3. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress."

. . . . . .

It will be noted that under section 6 *of this Ordinance the Governor-in-Council has power to make regulations. Of those which His Excellency has accordingly promulgated under date of the* 28*th January,* 1914, *the text runs as follows :—*

RULES MADE BY THE GOVERNOR-IN-COUNCIL UNDER SECTION VI OF THE TELEGRAPHS ORDINANCE 1913.

C 1. These rules may be cited for all purposes as "The Telegraph Rules, 1914."

2. The expression "the Company" shall mean any company, corporation or person for the time being engaged in the Colony or Protectorate of the Gambia in transmitting or receiving telegrams.

3. If and whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that the Government of the Colony and Protectorate of the Gambia shall

have control over the transmission of telegrams by the Company, it shall be lawful for the Governor by warrant under his hand to direct and authorise such persons as he may think fit to assume the control of the transmission of telegrams by the Company either wholly or partly and in such manner as he may direct, and such persons may enter upon the Company's premises accordingly or the Governor may direct the Company to submit to him or any person authorised by him all telegrams tendered for transmission or received by the Company or any class or classes of such telegrams, and to stop or delay the transmission of any telegrams or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of telegrams as the Governor may prescribe, and the Company shall obey and conform to all such directions.

Provided always that if default shall be made by the Company in the observance or performance of any provision hereinbefore contained it shall be lawful for the Governor by warrant under his hand to direct and cause so much of the Company's works as are in the Colony or Protectorate of the Gambia or any part of such works to be taken possession of for such services as to the Governor may seem fit, and in that event any person authorised by the Governor may enter upon the offices and works of the Company or any of them and take possession thereof and use the same as aforesaid. Nothing herein contained shall be deemed in any way to prejudice or abridge the power of the Government of the Colony and Protectorate of the Gambia to take possession under or by virtue fo any agreement for the time being in force.

4. In any such case as aforesaid if the Company show that during the exercise of any of the powers aforesaid their receipts from the telegraphs with respect to which the said powers have been exercised have been less than their receipts from the same source during a corresponding period on the average of the last preceding three years, the Government of the Colony and Protectorate of the Gambia shall pay to the Company as compensation for any loss of profit sustained by the Company by reason of the exercise by the Governor of any of the powers hereby reserved such sum as may be settled between the Governor and the Company by agreement or as in case of difference may be determined by arbitration. Provided always that no such compensation as aforesaid shall be paid if and so far as the powers hereby reserved to the Governor are exercised for the prupose of preventing direct communication with any of His Majesty's enemies, and save with the consent of the Governor no such compensation shall be paid if and so far as the powers aforesaid are exercised for the purposes of preventing indirect or suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprehension of impending war.

5. In estimating such compensation as in the preceding section provided the Arbitrator shall take into account all the circumstances of the case, including not only any such loss as aforesaid but also any additional profit accruing to the Company from the emergency which gave rise to the exercise of the powers aforesaid, and as regards the telegraphs with respect to which the said powers have been exercised the receipts of the Company on the average of the last preceding three

years during a period corresponding to that of the exercise of the said powers shall be deemed to be the receipts which the Company would have taken during the period of the exercise of the said powers had the powers not been exercised.

GERMANY

A—Telegraph Law of the German Empire, 6th April, 1892, and 7th March, 1908.

B—Regulations (Foreign Ships).

C—Conditions of Concession (Ship Stations).

D—Regulations (Receiving Stations).

E—Decree of 14th October, 1913 (Foreign Ships).

A *Sole Article:*—The Act of April 6th, 1892, relating to telegraphs in the German Empire is modified as follows :—

1. Article 3 is completed by the following Paragraph 2 :

Installations of electric telegraphs for transmission of messages without the aid of metallic wires of junction, shall not be established and worked, except with the authorisation of the State.

2. The following provisions are inserted after Article 3 :

(3 *a*) Telegraphic installations which are not exclusively designed for the internal service of a ship, cannot be established and worked on German vessels, unless authorised by the State.

(3 *b*) The Imperial Chancellor shall decree the regulations concerning the working of telegraphic stations on board foreign vessels in German territorial waters.

3. Article 7 is completed by the following paragraph (2) :

The provision of Paragraph 1, Phrase 1, does not apply till July 1st, 1913, to installations of the nature defined in Article 3, Paragraph 2.

B THE following regulations are decreed for the working of telegraphic installations on board foreign ships in German territorial waters, and are founded on Article 3 (*c*) of the "Telegraph Law of the German Empire" of April 6th, 1892, and March 7th, 1908, and under the reservation of Article 15 of this law :—

1. Ships of war are authorised, in a general manner,

(*a*) To exchange messages, signals, by means of optic and acoustic signals, submarine acoustic signalling excepted.

(*b*) To use wireless telegraphy, on condition that they do not disturb the radiotelegraphic service of the public coast stations, or the service of the coast or ship stations of the Imperial Navy.

In exchanging messages with German or foreign radiotelegraphic stations, foreign vessels must conform to the regulations of the "Decree for the Regulation of the Radiotelegraphic Service" and to the Decrees which may ultimately be promulgated.

2. Foreign vessels other than ships of war are authorised—till otherwise decreed—

(*a*) To exchange messages by means of optic and acoustic signals, submarine acoustic signalling excepted, and under the reservation that within the illumination zone of the navigable waters of the German coasts and islands the lights of the signal projectors or lanterns must not exceed that prescribed for fixed lights.

(*b*) To use wireless telegraphy in conformity with the provisions of the "Decree Regulating the Radiotelegraphic Service" and the decrees which may ultimately be promulgated; nevertheless, in the ports, roadsteads, and estuaries, and in the navigable waterways of the interior, wireless telegraphy can only be used on an authorisation being granted in writing by the Ministry of Posts and Telegraphs of the German Empire.

3. In the public interest the Articles 1 and 2 may be temporarily restricted or suspended.

4. Whosoever works telegraphic installations in a way not authorised by the preceding provisions is liable to fines determined in Article 9 of the "Law of Telegraphs," and in virtue of Article 40 of the Penal Code of the German Empire, all the apparatus designed for the transmission of wireless messages can be confiscated. Moreover, installations which have been worked without a licence can be, in conformity with Article 11 of the "Telegraph Law," removed or rendered unserviceable.

C THE following are some of the principal conditions on which the concession for the installation and working of a radiotelegraph station on board ship is granted:—

1. The concession for the installation and working of the ship station may be withdrawn at any time.

2. The station must fulfil the following requirements:—

(*a*) The construction of the station must be in accordance with modern developments of science and technology.

(*b*) The ship station must be equipped in such a way as to be able to use the two wave lengths of 600 and 300 metres.

(*c*) The waves must be as pure and little damped as possible. The use of sending arrangements, with which the production of the emitted waves takes place by direct sparking discharges of the antenna, is not permitted, except in cases of distress. However, it may be allowed for certain special stations (*e.g.*, for such on small ships) the primary energy of which does not exceed 50 watts.

(*d*) The power transmitted by the radiotelegraphic apparatus, measured at the terminals of the generator, must not under normal conditions exceed one kilowatt.

(*e*) With the reservation of the special provisions concerning the application of the 1,800 m. wave, a power of more than one kilowatt may be used if the ship must maintain communica-

tion over a distance exceeding 200 nautical miles from the nearest coast station, or if, in consequence of exceptional circumstances, communication cannot be maintained except by means of an increase of power.

(*f*) The apparatus must be suitable for transmitting and receiving at a speed of at least 20 words per minute, five letters being counted as one word. Installations working with more than 50 watts must be equipped so as to be able to cover several distances within the normal range of transmission, the shortest of which shall be about 15 nautical miles.

(*g*) The receiving apparatus must be capable of reception up to 600 miles with the greatest possible protection against disturbances.

3. Ships belonging to the two first categories stated under Article 8, in addition to the ordinary apparatus, must be equipped with emergency gear having an independent source of power and capable of working for at least six hours, with a minimum range of 80 nautical miles in the case of ships in the first category, and of 50 nautical miles of those of the second category. The emergency gear is not necessary in the case of ships whose ordinary plant fulfils the conditions for emergency sets.

The emergency gear, as well as the ship stations themselves, must be placed as high as possible above the deck—viz., according to the structure of the ship and the available space, either equal to the height of the bridge or of the large boat's deck, so that in case of accident they shall be able to remain longest above the water. When using batteries for the emergency plants accumulators may be arranged in the station room itself, whilst acid accumulators, on account of the vapours which they develop, must be placed outside the station room, but in its immediate vicinity, and so that they are protected against outside influences.

4. The contractor must submit to the Imperial Telegraph Administration a description of the ship station, together with a plan of the circuits. Subsequent alterations of the technical equipment affecting transmission or reception must not be made without the consent of the Imperial Telegraph Administration.

5. In order to examine the prescribed arrangement of the ship's station, and the carrying out of the service, the officers of the Imperial Telegraph Administration are permitted at any time to enter the rooms where the apparatus are installed, and to inspect the working equipments.

6. The radiotelegraph service on the ship must be operated only by German subjects.

7. The service of the ship station must be carried out by an operator holding a certificate issued by the Imperial Telegraph Administration, or in an emergency, and for one journey only, by another Government which is a party to the International Radiotelegraphic Convention.

There are two classes of certificates.

The first-class certificate for the capability of the operator, with regard to:—

(*a*) The adjustment of the apparatus and knowledge of the methods of working.

(*b*) Transmitting of telegrams and receiving by sound at a speed of at least 20 words per minute.

(*c*) Knowledge of the regulations applying to the exchange of radiotelegraphic communication.

The second-class certificate may be issued to an operator who attains in transmitting and receiving a speed of 12 to 19 words per minute, but who fulfils the other conditions mentioned above. Operators holding a second-class certificate may be admitted:—

(*a*) On ships which use radiotelegraphy for their own service only and for the exchange of messages of the crew, in particular on fishing vessels.

(*b*) On all ships as junior operators, provided that such ships have on board at least one operator holding the first-class certificate. Nevertheless on ships placed in the first category mentioned in Article 8 the service must be carried on by at least two operators holding the first-class certificate.

Transmission may be made only by an operator holding either the first or second-class certificate, except in cases of emergency.

8. Ship stations are placed in three categories:—

1. Stations always open.
2. Stations having limited working hours.
3. Stations having no fixed working hours.

During navigation the following must remain permanently on watch:—

1. The stations of the first category.
2. Those of the second category during the hours that they are open for service, out of these hours these stations must remain on the watch for the first ten minutes of each hour.

The stations of the third category are not bound to perform any regular "listening" service.

9. The ship station operator is under the supreme authority of the captain or of the captain's representative, who, in his capacity as superintendent of the ship station, is entitled to note the contents of all telegrams provided he has been placed by the Imperial Telegraph Administration, or, in the case of ships that are permanently abroad, by a German Consulate (General or Vice-consulate), under the obligation of preserving the secrecy of correspondence.

10. The certificate may be withdrawn if, in case of any offences against the "Regulations for the Radiotelegraph Service," the operator has been found guilty after an inquiry.

11. If it is shown that the offence is due to the condition of the apparatus or to instructions given to the operator, the same procedure will be followed in respect of the licence issued to the ship.

12. The certificate may also be withdrawn if it is stated by an officer of the Imperial Telegraph Administration that the operator is no more in possession of the prescribed knowledge and skill. In the latter case a certificate will be granted to the operator after he has successfully passed a further examination.

13. Every change in the staff of the ship station must be reported immediately to the local post office of the home port.

14. The ship station is bound to interchange radiotelegrams with every coast station and with every other ship station, without regard to the particular system of radiotelegraphy employed.

15. The Radiotelegraph Service is regulated in accordance with the rules in the "Instructions for the Radiotelegraph Service." In addition, special instructions which may be issued by the Imperial Telegraph Administration must be observed also.

. . . .

22. The ship station must be in possession of the certificate from the Imperial Telegraph Administration, stating that the installation and the working of the station have been licensed by the authority named and the category in which the station is placed. This certificate must be kept in the station and presented upon the request of the authorities of the countries at the ports at which the ship calls.

D REGULATIONS have been adopted concerning the installation and working of wireless telegraph receiving stations. The licence, which may be revoked at any time, applies only to the use of stations for receiving time signals from Norddeich, which uses a wave of 1,650 m.

The installation must fulfil the following technical requirements :—

(*a*) The receiving apparatus shall be adjusted so that the owner of the station may alter the syntonisation only within the immediate vicinity of the prescribed wave-length. The adjustable wave-lengths shall not differ by more than 5 per cent. above or below the prescribed wave-length.

(*b*) The antenna shall not be larger than is necessary for the intended reception.

(*c*) The single parts of the oscillatory circuits, also of the antenna circuit, shall be connected firmly and permanently with each other by being soldered together; exceptions are only admissible at the connecting terminals of the detectors and of the telephone receivers.

(*d*) The soldered joints shall be enclosed in casing containing all the parts of the apparatus, and this must be sealed, so that only the handle of the tuning device and the connecting terminals of the detectors and of the telephones are accessible to the owner. For the connection of the antenna wire a sound insulating wrapper shall be used.

(*e*) No later connection of circuits or tuning devices shall be permitted.

The controlling officials of the Imperial Telegraph Administration, of the Imperial Naval Administraton, and of the Administration of the Army are permitted at any time to enter the premises where the apparatus is situated and to inspect the station and everything appertaining thereto. The licensee is pledged to

secrecy in respect of any messages that he may intercept. He must suspend working temporarily when requested to do so by the Imperial Telegraph Administration or the naval or military authorities.

E THE German Official Journal No. 73 of 1913 published a Decree of the Chancellor of the 14th October, 1913, referring to the modification of regulations for the working of telegraph stations on foreign ships in German waters. According to these regulations, wireless telegraphic traffic of foreign ships in German waters and in German rivers is subject to the following:—

(*a*) Foreign men of war may use their apparatus on condition that the public coast stations and coast and ship stations of the German marine are not hindered. In exchanging traffic with German or foreign wireless stations the rules laid down in the "Anweisung fuer den Funkentelegraphendienst" (Regulations for the Wireless Telegraph service) must be followed.

(*b*) Other foreign craft are only permitted to use their wireless apparatus in accordance with the above-mentioned regulations, but within German ports, roadsteads, river mouths, as well as within inner waterways, wireless apparatus may only be used with the written permission of the German Postal Authorities.

GIBRALTAR

A—Wireless Telegraph Apparatus Ordinance, 1903 and 1909.

B—Wireless Telegraph Apparatus Further Amendment Ordinance, 1909.

C—Rules as to use on Merchant Ships.

THERE are no commercial wireless telegraph stations in Gibraltar, and the right to use wireless telegraphy is reserved to the Government.

The following Ordinance to prohibit the importation, keeping, use or establishment of any apparatus or installation for transmission of messages by wireless telegraphy by unauthorised persons in Gibraltar came into force on October 20th, 1903. This Ordinance has been amended by the Wireless Telegraph Apparatus Amendment Ordinance, 1909 (February 3rd), and in the text below the amending words are shown in brackets:

A 1. This Ordinance may be cited as "The Wireless Telegraph Apparatus Ordinance, Gibraltar, 1903."

2. No person shall import, keep, use or establish in Gibraltar [*or on board any British ship registered in Gibraltar*] any apparatus or installation for the receipt or transmission of messages by wireless telegraphy without the licence in writing of the Governor, and under such terms and conditions as may be prescribed in such licence, which licence the Governor may in his discretion at any time cancel and revoke.

3. It shall be lawful for the Governor by order in writing to

authorise the Chief of Police or any other person named by him in such order to enter at any time by day or night and by force, if necessary, any premises or place [*or any ship*] in Gibraltar, and to search for any such apparatus or installation as described in this Ordinance, and to seize and remove the same to be dealt with in such manner as the Governor may direct.

4. Any person offending against this Ordinance, or resisting or in any way interfering with any person charged with the execution of an order issued by the Governor under the preceding section, may be arrested without warrant and shall be liable on conviction by a Court of Summary Jurisdiction to a penalty not exceeding £50, or to imprisonment with or without hard labour for any term not exceeding three months.

5. All penalties under this Ordinance shall be recoverable summarily in manner directed by "The Justices Ordinance, Gibraltar, 1890."

B THE "Wireless Telegraph Apparatus Further Amendment Ordinance, Gibraltar, 1909" (April 30th), contains the following clause:—

2. A person shall not work any apparatus for wireless telegraphy installed on merchant ships, whether British or foreign, while in Gibraltar, otherwise than in accordance with rules made in that behalf by the Governor, and the Governor may, by any such rules, impose penalties recoverable summarily for the breach of any such rules, not exceeding ten pounds for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ships. All such rules shall be published in the Official Gazette and after such publication shall have the same force and effect as if enacted in this Ordinance.

C THE following Rules as to the use of wireless telegraph apparatus on merchant ships, whether British or foreign, while in Gibraltar, were made on May 3rd, 1909, under "The Wireless Telegraph Apparatus Further Amendment Ordinance, Gibraltar, 1909":—

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of Gibraltar shall be worked in such a way as not to interfere with (*a*) Naval signalling, or (*b*) the working of any wireless telegraph station lawfully established, installed or worked in Gibraltar or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of Gibraltar, except with the special or general permission in writing of the Governor.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's

Government should have control over the transmission of messages by wireless telegraphy the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These rules shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Any person offending against any of these rules shall be liable to a penalty not exceeding ten pounds for each offence recoverable summarily under "The Justices Ordinance, Gibraltar, 1890" and any apparatus for wireless telegraphy installed or worked on such ship may be forfeited to His Majesty.

GOLD COAST COLONY

A—Wireless Telegraphy Ordinance, 1903.

B—Wireless Telegraphy Ordinance, 1913.

C—Regulations (Merchant Ships).

A AN Ordinance to regulate communication by Wireless Telegraphy was issued on September 22nd, 1913:—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1903."

2. No person shall establish or use any apparatus or installation for the purpose of communication by wireless telegraphy without a licence from the Governor. Any such licence may be granted on such terms and conditions as the Governor may prescribe.

3. Any person who shall contravene the provisions of the preceding section or any of the terms or conditions of any licence granted hereunder shall be guilty of an offence and shall on conviction before a District Commissioner be liable to a penalty not exceeding £100 or to imprisonment with or without hard labour for a period not exceeding six months or to both, and the apparatus or installation in respect of which the offence is committed shall be forfeited to His Majesty.

4. The Governor in Council may from time to time make, revoke or alter rules for further or better carrying into effect any of the purposes of this Ordinance, and such rules shall on publication in the "Gazette" have the same effect as if enacted in this Ordinance.

B THE following Bill, which has been read a first time at a meeting of the Legislative Council held at the Public Offices, Victoriaborg, Accra, on Wednesday, August 6th, 1913, is published for general information:—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "wireless telegraphy" means any system of

communication by telegraphy without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the Colonial waters otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the "Gazette" have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the Colonial waters shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate or District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting THAT A WIRELESS telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the Commissioner of Police and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before a District Commissioner's Court on the complaint of a Commissioner of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphy Ordinance, 1903, and the Wireless Telegraphy (Amendment) Ordinance, 1913, are hereby repealed.

GREAT BRITAIN

A—Wireless Telegraphy Act, 1904.
B—Order in Council, 29th February, 1908.
C—Wireless Telegraphy (Foreign Ships) Regulations, 1908.
D—Ship Stations Licence.
E—Private Business Licence.
F—Board of Trade Notice (Signalling Practice).
G—Merchant Shipping (Convention) Act, 1914. (Part III.)
H—Notices in the *London Gazette*, 1914.
I—Defence of the Realm Regulations, 1914.
J—Proclamation extracted from *London Gazette*, July 28th, 1916.

THE Postmaster-General is responsible for the administration of wireless telegraphy in Great Britain and Ireland.

The following are the officers who form the Department of Wireless Telegraphs at the General Post Office, London, E.C. :—Postmaster-General, Rt. Hon. A. H. Illingworth, M.P., P.C.; Secretary to Post Office, George Evelyn P. Murray; Assistant Secretary, E. W. Farnall, C.B.; Principal Clerk, F. J. Brown; First Class Clerk, J. I. De Wardt.

Department of the Inspector of Wireless Telegraphy :—Inspector of Wireless Telegraphy, Commander F. G. Loring, R.N., M.I.E.E.; Deputy Inspector of Wireless Telegraphy, Major C. G. C. Crawley, R.M.A., M.I.E.E.; Assistant Inspectors, F. Addey, B.Sc. Lond., A.M.I.E.E., and O. F. Brown, M.A., B.Sc. Oxon., B.Sc. Lond.

Early in 1914 a Bill was presented to the House of Commons by the President of the Board of Trade to amend the laws relating to merchant shipping so as to give effect to the International Convention for the Safety of Life at Sea, signed at London on January 20th, 1914 Under the title "Merchant Shipping (Convention) Act, 1914," this Bill was passed in August, 1914, and was due to come into force on July 1st, 1915, but has not yet been put into operation. Part III. of the Act refers to wireless telegraphy and is to be found on page 239.

At the outbreak of war all wireless stations in the British Empire were brought under the control of the Government, and in the following pages we have included the notices which were published in the *London Gazette* of August 2nd and 3rd, 1914, and also an extract from the Defence of the Realm (Consolidation) Regulations, 1914, which relates to the prohibition of the possession of wireless telegraphic apparatus, unless with the official permission of the Postmaster-General. All amateur and experimental stations have been closed, and there is no probability of their being re-opened until the end of the war, when it is anticipated that the provisions of the licences will be considerably

revised. For this reason we have not included the particulars of these licences in the following pages, but they are to be found in the YEAR-BOOK for 1914 (pp. 183-188).

Wireless Telegraphy Act, 1904.

A FOLLOWING the termination of the meeting of the delegates at the international Conference in Berlin in 1903, the British Government drafted a Wireless Telegraph Act to define the official position of the Postal and Telegraph Department in the United Kingdom in regard to the new development. The Act received Royal assent on August 15th, 1904, and the text is as follows :—

1.—(1) A person shall not establish any wireless telegraph station, or instal or work any apparatus for wireless telegraphy, in any place or on board any British ship except under and in accordance with a licence granted in that behalf by the Postmaster-General.

(2) Every such licence shall be in such form and for such period as the Postmaster-General may determine, and shall contain the terms, conditions, and restrictions on and subject to which the licence is granted, and any such licence may include two or more stations, places, or ships.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or instals or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour, and be liable, on conviction under the Summary Jurisdiction Acts, to a penalty not exceeding ten pounds, and on conviction on indictment to a fine not exceeding one hundred pounds, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Act except by order of the Postmaster-General, the Admiralty, the Army Council, or the Board of Trade.

(4) If a justice of the peace is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within his jurisdiction without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Postmaster-General, the Admiralty, the Army Council, or the Board of Trade, and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) Sections 684, 685, and 686 of the Merchant Shipping Act, 1894 (which relate to the jurisdiction of courts and justices), and section 693 of the same Act (which relates to distress for sums ordered to be paid by masters and owners of ships), shall apply to the jurisdiction of courts and justices in respect of ships, and to distress under this Act.

(6) The Postmaster-General may make regulations for prescribing

the form and manner in which applications for licences under this Act are to be made, and, with the consent of the Treasury, the fees payable on the grant of any such licence.

(7) The expression "wireless telegraphy" means any system of communication by telegraph as defined in the Telegraph Acts, 1863 to 1904, without the aid of any wire connecting the points from and at which the messages or other communications are sent and received: Provided that nothing in this Act shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2.—(1) Where the applicant for a licence proves to the satisfaction of the Postmaster-General that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy, a licence for that purpose shall be granted, subject to such special terms, conditions, and restrictions as the Postmaster-General may think proper, but shall not be subject to any rent or royalty.

(2) Where an applicant for a licence satisfies the Postmaster-General that a wireless telegraph station is to be used solely for the transmission of telegrams which are within the first or second exception from the exclusive privilege of transmitting telegrams conferred upon the Postmaster-General by the Telegraph Act, 1869, a licence for that purpose, if granted, shall not be subject to any rent or royalty.

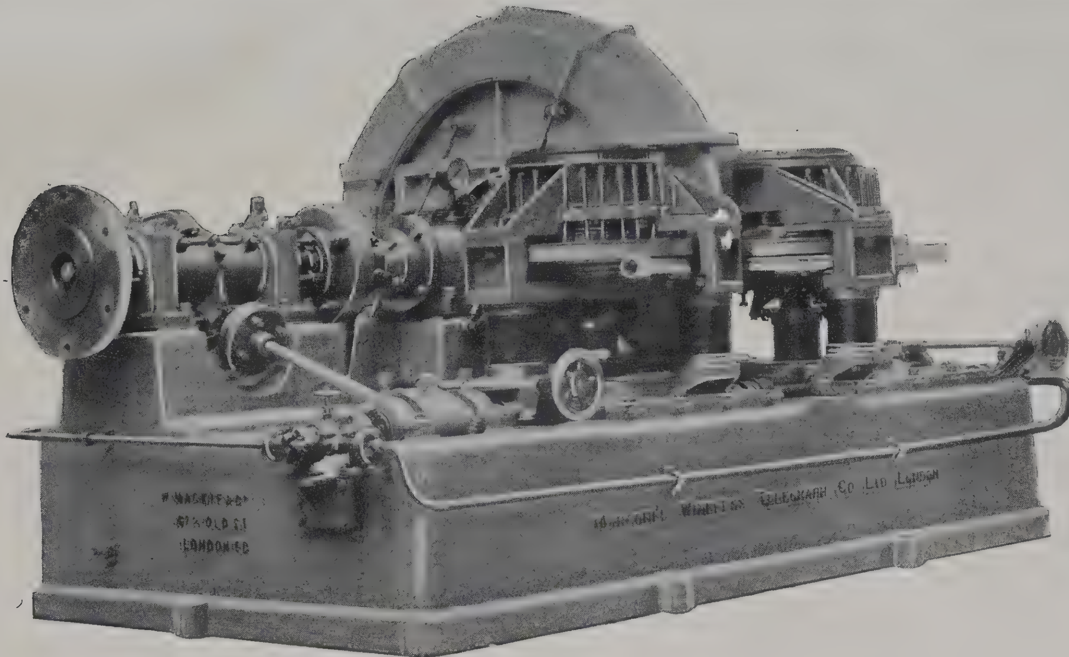
(3) It shall be lawful for the Postmaster-General, due regard being had to the maintenance and exercise of effective control over wireless telegraphy, to grant special licences at reduced terms for the establishment and working of wireless telegraph stations to be used exclusively for the transmission within the United Kingdom of news to public registered newspapers. A schedule of all reduced rents or royalties imposed by any special licences shall be laid before both Houses of Parliament within fourteen days of the commencement of the session next succeeding the grant of any such licences.

3.—(1) This Act may be cited as the Wireless Telegraphy Act, 1904, and may be cited with the Telegraph Acts, 1863 to 1904.

(2) This Act shall extend to the whole of the British Islands and to all British ships in the territorial waters abutting on the coast of the British Islands, and the Royal Courts of the Channel Islands shall register this Act accordingly.

(3) His Majesty in Council may order that this Act shall, subject to any conditions, exceptions, and qualifications contained in the order, apply during the continuance of the order to British ships whilst on the high seas.

(4) A person shall not work any apparatus for wireless telegraphy installed on a foreign ship whilst that ship is in territorial waters otherwise than in accordance with regulations made in that behalf by the Postmaster-General, and the Postmaster-General may, by any such regulations, impose penalties recoverable summarily for the breach of any such regulations not exceeding ten pounds for each offence, and may provide for the forfeiture on any such breach of any apparatus for wireless telegraphy installed or worked on such ship. Save as aforesaid, nothing in this Act shall apply to the working of apparatus for wireless telegraphy installed on any foreign ship.



SYNCHRONOUS SPARK DISC DISCHARGER FOR HIGH-POWER STATIONS, 100 TO 300 KILOWATT.

[To face page 224.

4.—In the application of this Act to Scotland the expression "Misdemeanour" means crime and offence.

5.—In the application of this Act to the Channel Islands and the Isle of Man—

(1) The Lieutenant-Governor of the Island of Jersey or the Island of Guernsey, and the Governor, Lieutenant-Governor, or Deputy Governor of the Isle of Man, as the case may require, shall be substituted for the Board of Trade.

(2) Offences may be prosecuted, fines recovered, proceedings taken, and search warrants issued in such courts and in such manner as may for the time being be provided in the Channel Islands and the Isle of Man by law, or if no express provision is made then in and before the courts and in the manner in which the like offences, fines, proceedings, and warrants may be prosecuted, recovered, taken, or issued therein by law, or as near thereto as circumstances admit, and the bailiff or his lieutenant, or any jurat of the Royal Court in the Island of Jersey or the Island of Guernsey, and the judge or any jurat of the Court of Alderney, and the high bailiff or two justices of the peace in the Isle of Man, shall respectively be substituted for a justice of the peace.

6. This Act shall continue in force until the thirty-first day of July, nineteen hundred and six, and no longer, unless Parliament otherwise determines. (It was renewed until 31st December, 1909, and has since been extended from year to year by the Expiring Laws Continuance Act.

B THE following Order in Council is dated 29th February, 1908:—

(1) The Wireless Telegraphy Act, 1904, shall apply to British ships whilst on the high seas, provided that a person on board a British ship which is registered in any British possession (other than the Channel Islands and the Isle of Man), or in any British Protectorate shall not be deemed to commit an offence against the Wireless Telegraphy Act, 1904, by reason of the installation or working of wireless telegraphy on such ship if the authority in such Possession or Protectorate, having power by law so to do, shall have granted a licence for the installation and working of apparatus for wireless telegraphy on that ship, and if such person is acting in accordance with the provisions of such licence.

(2) The Interpretation Act, 1889, shall apply for the purpose of the interpretation of this Order as it applies for the purpose of the interpretation of an Act of Parliament.

(3) This Order shall be published in the *London Gazette*, and shall come into operation immediately from and after the expiration of three months after this Order is so published.

(4) This Order may be cited as "The Wireless Telegraphy Order, 1908."

C AN Order was issued in 1908 (No. 496) containing regulations relating to foreign ships:—

1. In these Regulations unless the context otherwise requires—

"Wireless Telegraphy" has the same meaning as in the Wireless Telegraphy Act, 1904.

"Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

"Territorial Waters" means such part of the sea adjacent to the coast of the British Islands as is deemed by international law to be within the territorial sovereignty of His Majesty, and includes harbours.

"Harbour" includes harbours properly so called, whether natural or artificial estuaries, navigable rivers, piers, jetties, and other works in or at which ships can obtain shelter, or ship and unship goods or passengers.

2. When communications are made by means of wireless telegraphy between a foreign ship in territorial waters and a wireless telegraph station in the British Islands, the rules in force for the working of wireless telegraphy at that station shall be observed.

3. All apparatus for wireless telegraphy on board a foreign ship in territorial waters shall be worked in such a way as not to interrupt or interfere with—

(*a*) Naval Signalling, or

(*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the British Islands or the territorial waters abutting on the coast of the British Islands, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

4. (1) Except with the special permission in writing of the Postmaster-General no apparatus for wireless telegraphy on board a foreign ship (other than a ship of war) shall be worked or used whilst such ship is in any harbour in the British Islands.

(2) Without prejudice to the operation of the general provisions of these Regulations, the use of wireless telegraphy on board a foreign ship of war while in a harbour in the British Islands shall be subject to such rules (whether prohibitive or regulative) as may be made by the Admiralty from time to time.

5. (1) If at any time in the opinion of one of His Majesty's Principal Secretaries of State an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, and notice to that effect is published by the Postmaster-General, after the publication of such notice and until further notice the use of wireless telegraphy on board foreign ships whilst in territorial waters shall be subject to such rules as may be made by the Admiralty from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

(2) Such notice as aforesaid shall be published in the *London Gazette*, the *Edinburgh Gazette*, and the *Dublin Gazette*, and in such other manner, if any, as to the Postmaster-General may seem fit.

6. (1) Any person who shall offend against any provision of these Regulations or of any Rules made by the Admiralty thereunder shall be liable on conviction under the Summary Jurisdiction Acts for every such offence to a penalty not exceeding ten pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy installed or worked on board the ship on which the offence was committed shall be seized and forfeited.

(2) For the purposes of any proceedings under these Regulations the master or person being or appearing to be in command or charge of any Foreign ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(3) Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

7. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

8. These Regulations shall come into operation on the first day of July, 1908.

9. These Regulations may be cited as "The Wireless Telegraphy (Foreign Ships) Regulations, 1908."

D THE following is a copy of the form of Licence granted by the Postmaster-General to establish Wireless Telegraph Ship Stations:—

LICENCE TO ESTABLISH WIRELESS TELEGRAPH SHIP STATIONS.

To all to whom these Presents shall come

I, The Right Honourable

His Majesty's Postmaster-General, send greeting:

Whereas by reason of the provisions of the Telegraph Acts 1863 to 1916 and the Wireless Telegraphy Order 1908 it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any British ship (whether in the territorial waters of the British Islands or on the high seas) except under and in accordance with a licence granted in that behalf by the Postmaster-General:

And whereas —— (hereinafter called the Licensee) has applied to the Postmaster-General for the grant of a Licence to establish, instal and work apparatus for wireless telegraphy as defined in Section 1 (7) of the Wireless Telegraphy Act 1904 at the ship station or stations mentioned in the Schedule hereto.

Now I the above-named —— His Majesty's Postmaster-General in exercise of all powers and authorities enabling me in this behalf do hereby grant to the Licensee during the term or period commencing on the day of the date hereof and continuing thereafter so long as the Defence of the Realm (Consolidation) Regulations 1914 shall remain in force licence and permission:—

(i) To establish, instal and work for the purposes hereinafter mentioned at the ship station or stations specified in the Schedule hereto apparatus for wireless telegraphy of the kind specified in the

Schedule hereto (which apparatus is hereinafter referred to as " the licensed apparatus ") :

Provided that—

(*a*) Each ship station shall be of such class mentioned in Article XIII of the Service Regulations annexed to the Radiotelegraph Convention 1912 as is specified in the said Schedule opposite to the name of such station.

(*b*) The apparatus installed at each ship station shall be of the character specified in the said Schedule opposite to the name of such station.

(*c*) The sending apparatus used at each ship station shall be of such a character that the waves emitted are as pure and as little damped as possible, and the receiving apparatus used at the said station or stations shall be of such a character as to afford the greatest possible protection from disturbance during the reception of signals.

(*d*) The apparatus shall include such emergencv installation as may be required according to the class of the ship station under the provisions of Article XI of the Service Regulations annexed to the Radiotelegraph Convention 1912.

(*e*) The licensed apparatus shall be so constructed as to be capable of using wave lengths of 600 and 300 metres in length as measured by the standard of measurement in use by the Post Office for the time being, and such other wave lengths not exceeding 600 metres in length as shall be authorised in writing from time to time by the Postmaster-General. Provided always that the wave lengths of 600 metres shall normally be used for communication, and further, that the wave lengths of 1,800 metres may be used for transmission in the exceptional case contemplated by Article XXXV (2) (*a*) of the Service Regulations annexed to the Radiotelegraph Convention 1912.

Provided further that only the wave lengths of 600 metres shall be used by the Licensee during the period of any war in which the United Kingdom is engaged.

(*f*) The apparatus shall admit of the transmission and reception of messages at the rate of not less than twenty words a minute, five letters being counted as one word.

(ii) To send and receive messages by means of the licensed apparatus between the said ship stations and also between the said ship stations and coast stations and other ship stations. Provided that the Licensee shall not except with the consent in writing of the Postmaster-General send or receive messages from and at the said ship stations when in any harbour in the British Islands ; and

(iii) To receive money or other valuable consideration for or in respect of the use of the licensed apparatus or for or in respect of the transmission or receipt of messages by means of the said apparatus.

And I do hereby declare that the said licence and permission is granted on and subject to the following conditions and provisions :—

1. *Interpretation clause.*—In these presents (and in the Schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either

in the subject or context repugnant to such construction (that is to say) :—

The expression "the Postmaster-General" means the Postmaster-General for the time being.

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1904.

The term "telegraph" has the same meaning as in the Telegraph Act 1869.

The expression "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station, whether a coast station or a ship station.

The expression "the Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

The expressions "the International Telegraph Convention" and "the International Telegraph Regulations" mean respectively the International Convention of St. Petersburg, dated July 10th to 22nd, 1875, and the Service Regulations made thereunder and include respectively any modifications of the Convention or Regulations made from time to time.

The expression "the Radiotelegraph Convention 1912" means the Convention signed at London on July 5th, 1912, and the Service Regulations made thereunder and includes any modification of the Convention or Regulations made from time to time.

The expression "coast station" means a wireless telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

The term "ship station" means a wireless telegraph station established on board a ship which is not permanently moored.

2. On and after the —— day of —— 191 the installation and maintenance of each of the ship stations mentioned in the Schedule hereto by the Licensee shall subject to the provisions of this Licence be deemed compulsory in accordance with the provisions of Regulation 37B of the Defence of the Realm (Consolidation) Regulations 1914.

3. *Restriction on use of apparatus.*—The licensed apparatus shall not be used by the Licensee or by any other person either on behalf or by permission of the Licensee for the despatch or receipt of messages except messages authorised by this Licence.

4. *Protection of Naval signalling.*—(1) The Licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with Naval signalling.

(2) If the Admiralty are of opinion that the working of the licensed apparatus at any ship station specified in the Schedule hereto is inconsistent with the free use of Naval signalling, the Licensee shall when required in writing by the Postmaster-General so to do close the said station.

(3) These provisions for the protection of Naval signalling shall be construed to be without prejudice to the generality of any other provisions of this Licence.

5. *Licensee to observe International Telegraph Convention and Regulations.*—For the purpose of this Licence the Licensee shall observe the International Telegraph Convention and the International Telegraph Regulations so far as the said Convention and Regulations are capable of being applied to wireless telegraphy in common with ordinary land and submarine telegraphy.

6. *Licensee to observe regulations as to wireless telegraphy.*—The Licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 1916 by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business so far as the same are applicable to the Licensee.

7. *Radiotelegraph Convention to be observed.*—The Licensee shall observe the provisions of the Radiotelegraph Convention 1912.

8. *As to interference.*—The Licensee shall comply with all such directions and observe all such rules as may be given or made by the Postmaster-General from time to time for the purpose of preventing inteference with the working of any other wireless telegraph station and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station.

9. The Licensee shall comply in all respect with all such directions and regulations as may from time to time be given or made by the Admiralty.

10. *Alteration of apparatus.*—The licensed apparatus shall not without the consent of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedule hereto.

11. *Indemnity of Postmaster-General.*—The Licensee shall at all times indemnify the Postmaster-General against all actions, claims, and demands which may be brought or made by any corporation, company or person in respect of any injury arising from any act licensed or permitted by these presents.

12. *Messages to be transmitted without favour or preference.*—(1) Subject to the provisions of this Licence the Licensee shall transmit messages by means of the licensed apparatus on equal terms without favour or preference, whether as regards rates of charge, order of transmission or otherwise. Provided always that signals of distress and messages in connection therewith shall receive priority over all other messages and that the order of transmission of such other messages shall be governed by the International Telegraph Regulations.

(2) In respect of messages transmitted on behalf of His Majesty's Government or the Government of any British Possessions or Protectorate, the Licensee shall charge rates not in excess of half of the rates charged to the ordinary public.

13. *Licensee to receive signals of distress.*—The Licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress, and shall answer such requests and signals and send them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the Licensee.

14. *As to persons employed to work stations and manner of working.*

—(1) The licensed apparatus at each of the ship stations mentioned in the Schedule hereto shall be worked only by operators holding certificates issued by the Postmaster-General, and the Licensee shall provide for the working of each station such operators as are required by the provisions of Article X of the Service Regulations annexed to the Radiotelegraph Convention 1912 according to the class of the ship station, and shall observe the regulations as to the working of the ship station laid down according to its class by Article XIII of the said Regulations.

(2) A certificate shall not be recognised as authorising the holder to work a ship station under the terms of this Licence unless it bears a statement that it is issued by the Postmaster-General in accordance with the Radiotelegraph Convention 1912. Such certificates will be valid only during the operation of the said Convention. They will be granted to persons of such technical proficiency and will be in such form and will be subject to such conditions as the Postmaster-General shall from time to time prescribe, and they may be endorsed or withdrawn at the discretion of the Postmaster-General in case of misconduct or breach on the part of the holder of the regulations prescribed for the working of ship stations.

15. *Provisions as to secrecy*.—The Licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the Licensee and not intended for receipt by means of the licensed apparatus. The Licensee shall exhibit at each of the ship stations specified in the Schedule hereto a copy of Section 11 of the Post Office (Protection) Act 1884, and any contravention of that section by any person in the employment of the Licensee shall be deemed to be a breach of the provisions of this Licence.

16. *Registers of messages to be kept*.—The Licensee shall keep full accounts, records and registers of all messages transmitted by means of the licensed apparatus, and in such registers each of such messages shall be accompanied by its identifying number and date and full particulars of its place of origin and of ultimate destination and such further particulars as the Postmaster-General shall from time to time reasonably require to be shown, messages on His Majesty's service being in such registers distinguished from other messages. The Licensee shall preserve all used message forms written and printed and transcripts of messages and all other papers for a period of at least fifteen months, counting from the month following that in which the radiotelegrams were handed in as prescribed by the Radiotelegraph Convention 1912, and such registers and message papers shall be open to the inspection of the Postmaster-General or his officers thereto authorised at the registered office of the Licensee for the time being or at such other place as may be agreed between the hours of 10 a.m. and 5 p.m. on every day except Sunday or a statute or general holiday.

17. *Accounts*.—The Licensee shall render to the Postmaster-General such accounts as the Postmaster-General shall direct in respect of all charges due or payable under the Radiotelegraph Convention 1912 in respect of messages exchanged between the ship stations hereby licensed and coast stations, and shall pay to the Postmaster-General at such times and in such manner as the Postmaster-General shall direct all sums which shall be due from the Licensee under such accounts.

18. *Power to Postmaster-General to inspect apparatus.*—The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the ship stations hereby licensed for the purpose of inspecting, and may inspect any apparatus fixed or being in such stations respectively for the purpose of sending and receiving messages by wireless telegraphy, and all other telegraphic instruments and apparatus fixed or being in such stations respectively and the working and user of such apparatus and telegraphic instruments respectively.

19. *Licence and other documents to be carried by ships.*—The Licensee shall carry on every ship on which a ship station is established under this Licence a print or copy of the Licence certified under the hand of an appropriate officer of the Postmaster-General to be a true copy, and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls. The Licensee shall also carry on every such ship such documents as may be prescribed by the Postmaster-General for the purpose of enabling the Licensee to communicate with coast stations and ship stations in accordance with the Radiotelegraph Convention 1912.

20. *Royalties.*—(1) The Licensee shall pay to the Postmaster-General for and in respect of the Licence hereby granted a royalty of five shillings per annum in respect of each ship station at which the licensed apparatus is installed.

(2) The said royalty shall be payable on December 1st in each year during which the Licence remains valid.

21. *Licence not to be assigned.*—Except with the consent in writing of the Postmaster-General the Licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

22. *Powers to take possession of or control apparatus upon emergency.*—(1) Inasmuch as an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the tranmission of messages by the licensed apparatus it shall be lawful for any Naval, Military, Customs, or Police Officer, or any other person authorised by the Admiralty to take possession of the licensed apparatus or any part thereof in the name and on behalf of His Majesty and to use the same for His Majesty's service, and any such officer or person so authorised may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid and subject to such use may use the same or allow it to be used for such ordinary services as may in his discretion seem fit to him, or may prohibit and take steps to prevent the use of the same and issue directions which shall be obeyed by the Licensee to prevent such use.

(2) Any such officer or person so authorised as aforesaid may instead of taking possession of the licensed apparatus as aforesaid direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct, and such persons may enter upon any ship on which any apparatus is installed accordingly, or the

said officer or person so authorised as aforesaid may direct the Licensee to submit to him or any person authorised by him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said officer or person so authorised as aforesaid may prescribe, and the Licensee shall obey and conform to all such directions.

(3) The Licensee shall be entitled to reasonable compensation for any damage to the licensed apparatus arising in consequence of the exercise of the powers conferred by this clause.

23. *Licence not to affect Postmaster-General's rights.*—Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish, extend, maintain, and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit, neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in this Licence expressly provided) nothing herein contained shall be deemed to authorise the Licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

24. *Notices, etc.*—Any notice, request or consent (whether expressed to be in writing or not) to be given by the Postmaster General under these presents may be under the hand of any one of the Secretaries or Assistant Secretaries for the time being of the Post Office and may be served by sending the same in a registered letter addressed to the Licensee at the registered office for the time being of the Licensee, or if such notice, request or consent relates to any particular ship station by delivery to the master of the ship upon which such station is installed, and any notice to be given by the Licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office, London.

The Schedule of Ship Stations before referred to.

1. Name of Ship on which Station established.	2. Class of Ship Station under the Radiotelegraph Convention 1912.	3. Nature of Services performed.	4. Hours of Service.	Normal Range of Signalling in Nautical Miles. 5. By Night.	6. By Day.	Character of Apparatus. 7. System of Radiotelegraphy with the Characteristics of the System of Emission.	8. Wave lengths (in Metres).	9. Qualification of Operator.	10. Power. Source and Maximum Output.	Maximum to be taken by sending Instruments.	11. If Alternator is used, Number of Cycles per Second.
								See Clause 14 of the Licence.			

LICENSE TO USE WIRELESS TELEGRAPHY FOR PRIVATE BUSINESS.

E WHEREAS of in the county of (hereinafter called "the Licensee") is desirous of establishing installing working and using a system of wireless telegraphy as defined in section 1 (7) of the Wireless Telegraphy Act 1904:

AND WHEREAS by reason of the provisions of the Telegraph Acts 1863 to 19 it is unlawful to establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place except under and in accordance with a licence granted in that behalf by the Postmaster-General and it is also unlawful save as in the said Acts provided to transmit telegrams within the United Kingdom:

AND WHEREAS at the request of the Licensee I have agreed to grant to the Licensee the licences powers and authorities hereinafter expressed and contained for the period upon the terms and subject to the stipulations and conditions hereinafter appearing:

NOW I the above-named His Majesty's Postmaster-General in exercise of all powers and authorities enabling me in this behalf do hereby grant to the Licensee during the term or period commencing on the day of the date hereof and terminating on the 31st day of December 191 license and permission—

(i) to establish instal and work at the stations specified in the Schedule hereto apparatus for wireless telegraphy (hereinafter called "the licensed apparatus") provided that the apparatus installed at each station shall be of the character specified in the said Schedule opposite to the name of such station; and

(ii) to transmit and receive messages on the private business of the Licensee by means of the licensed apparatus between the said stations.

AND I do hereby declare that the said license and permission is granted on and subject to the following conditions and provisions:—

1. In these presents (and in the schedule hereto) the following words and expressions shall have the several meanings hereinafter assigned to them unless there be something either in the subject or context repugnant to such construction (that is to say):—

The expression "the Postmaster-General" means the Postmaster-General for the time being.

The expression "wireless telegraphy" has the same meaning as in the Wireless Telegraphy Act 1904.

The term "telegraph" has the same meaning as in the Telegraph Act 1869.

The expression "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy between ships of His Majesty's Navy and Naval Stations or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

The expression "the Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

Apparatus shall be deemed to be "syntonised" when the transmitting apparatus is so adjusted as to communicate with a receiver which has a corresponding adjustment and to produce as little effect as possible on a receiver not having a corresponding adjustment.

2.—(1) The licensed apparatus shall not be used by the Licensee or by any person either on behalf or by permission of the Licensee for any purpose except for the transmission and receipt of such messages as aforesaid between and at the stations specified in the Schedule hereto.

(2) No money or other valuable consideration shall be received by the Licensee or by any other person with the authority or by the permission of the Licensee in respect of the transmission or receipt of any messages by means of the licensed apparatus or any part thereof.

3.—(1) The licensee shall not by the transmission of any message by means of the licensed apparatus or otherwise by the use of the licensed apparatus interfere with naval signalling.

(2) Whenever the operators at any signal station of the Licensee perceive through the medium of the instruments used by them that naval signalling is proceeding they shall refrain from using the licensed apparatus until all indication that naval signalling is proceeding shall have ceased.

(3) The Licensee shall if so required in writing by the Admiralty cease to use the licensed apparatus for such period (not exceeding two hours in any one day) as may be specified by the Admiralty.

(4) If the Admiralty are of opinion that the working of the licensed apparatus at any station specified in the Schedule hereto is inconsistent with the free use of naval signalling the Licensee shall when required in writing by the Postmaster-General close the said station.

(5) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of this licence.

4. The Licensee shall observe the provisions of any Regulations from time to time made under the provisions of the Telegraph Acts 1863 to 19   by the Postmaster-General with the consent of the Treasury in relation to the conduct of wireless telegraph business.

5.—(1) The Licensee shall so work the licensed apparatus as not to interfere with the working of any wireless telegraph station established in the British Islands or the territorial waters abutting on the coasts of the British Islands (whether on shore or on any ship) by or for the purposes of the Postmaster-General or any department of His Majesty's Government or for commercial purposes and in particular with the transmission or receipt of any messages between or at wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(2) With a view to preventing such interference as aforesaid the Licensee shall comply with all directions which shall be given to the Licensee by the Postmaster-General and with all rules prescribed by the Postmaster-General for observance by his Licensees—

(*a*) With respect to all arrangements to be adopted for the purpose of securing syntonised apparatus or for enabling the messages

exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless telegraph station;

(*b*) With respect to any alternation of messages which the Postmaster-General may think necessary; and

(*c*) Generally with respect to avoiding interference between one wireless telegraph station and another.

6. The licensed apparatus shall not without the consent in writing of the Postmaster-General be altered or modified in respect of any of the particulars mentioned in the Schedule hereto.

7. The Licensee shall at all time indemnify the Postmaster-General against all actions claims and demands which may be brought or made by any corporation company or person in respect of any injury arising from any act licensed or permitted by these presents.

8. The Licensee shall so far as possible receive from ships and light stations all requests for assistance and all signals of distress and retransmit them with the least possible delay to the proper authorities by means of the licensed apparatus or any other means in the power of the Licensee.

9. Subject to the provisions of this licence the Licensee shall not divulge to any person (other than properly authorised officials of His Majesty's Government or a competent legal tribunal) or make any use whatever of any message coming to the knowledge of the Licensee and not intended for receipt by means of the licensed apparatus.

10. The Postmaster-General and any agent authorised in that behalf in writing by him may at all reasonable times enter upon all or any of the stations or other premises in the possession or occupation of the Licensee either solely or jointly with any other person or persons for the purpose of inspecting and may inspect any apparatus fixed or being in such places respectively for the purpose of sending and receiving messages by wireless telegraphy and all other telegraphic instruments and apparatus fixed or being in such places respectively, and the working and user of such apparatus and telegraphic instruments respectively.

11.—(1) All apparatus used or intended to be used by the Licensee shall be so erected fixed placed and used as not either directly or by reason of the working or user thereof to interfere with the efficient or convenient maintenance working or user of any telegraphic line of the Postmaster-General which may from time to time exist or which it is probable that the Postmaster-General may have occasion to erect place fix or use or to expose any such line to risk of damage or to risk of interference with the efficient or convenient working or user thereof.

(2) In case any telegraphic line of the Postmaster-General shall be damaged or the efficient working or user thereof shall be wholly or partially interrupted or otherwise interfered with and the Engineer-in-Chief for the time being of the Post Office shall certify in writing under his hand that such damage interruption or interference has been caused directly or indirectly by any apparatus used or intended to be used by the Licensee or by anything done by or on behalf of the Licensee in relation thereto the Licensee shall on demand pay to the Postmaster-General all costs that shall be reasonably incurred by him in repairing

such damage and in removing or altering such telegraphic line so as to restore the same to efficient working order and in adding thereto or substituting therefor either temporarily or permanently any other telegraphic line if the said Engineer-in-Chief shall certify that such addition or substitution is reasonably required.

(3) For the purposes of this Article the expression "telegraphic line" has the same meaning as in the Telegraph Act 1878 and the expression "telegraphic line of the Postmaster-General" includes a telegraphic line belonging to or worked by the Postmaster-General or constructed or maintained by him for any Department of the Government or other body or person.

12.—(1) The Licensee shall pay to the Postmaster-General on the 1st day of December next for and in respect of the licence hereby granted a royalty of £ per annum in respect of each station.

(2) In the event of the renewal of this licence the said royalty shall be payable on the same day in each succeeding year.

13. Except with the consent in writing of the Postmaster-General the Licensee shall not assign underlet or otherwise dispose of or admit any other person or body to participate in the benefit of the licences powers or authorities hereby granted or any of such licences powers or authorities.

14. If and whenever in the opinion of one of His Majesty's Principal Secretaries of State an emergency shall have arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus it shall be lawful for the said Secretary of State by warrant under his hand to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and in that event any person authorised by the said Secretary of State may enter upon the stations offices and works of the Licensee or any of them and take possession thereof and use the same as aforesaid.

15. The Postmaster-General may at any time in his absolute discretion give notice in writing to determine these presents and the license or permission hereby given at the end of one calendar month from the date of such notice and at the expiration of that period the licence or permission hereby granted shall cease and determine accordingly but without prejudice to any remedy of the Postmaster-General under any condition or provision herein contained.

16. In any of the following cases (that is to say) :—

(*a*) In case any sum of money which ought to be paid by the Licensee to the Postmaster-General under or by virtue of these presents shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained; or

(*b*) In case of any breach non-observance or non-performance by or on the part of the Licensee of any of the provisions (other than a provision for the payment of money) or conditions herein contained;

then and in any such case the Postmaster-General may by writing under his seal revoke and determine these presents and the licences

powers and authorities hereinbefore granted and each and every of them and thereupon these presents and the said licences powers and authorities and each and every of them shall absolutely cease determine and become void.

Provided always that no such revocation or determination as aforesaid shall prejudice or affect any right of action or remedy which shall have accrued or shall thereafter accrue to the Postmaster-General under any condition or provision herein contained.

17. Nothing in these presents contained shall prejudice or affect the right of the Postmaster-General from time to time to establish extend maintain and work any system or systems of telegraphic communication (whether of a like nature to that hereby licensed or otherwise) in such manner as he shall in his discretion think fit neither shall anything herein contained prejudice or affect the right of the Postmaster-General from time to time to enter into agreements for or to grant licences relative to the working and user of telegraphs (whether of a like nature to those hereby licensed or otherwise) or the transmission of messages in any part of the United Kingdom by means of wireless telegraphy or by any other means with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit and (save as in this licence expressly provided) nothing herein contained shall be deemed to authorise the Licensee to exercise any of the powers or authorities conferred on or acquired by the Postmaster-General by or under the Telegraph Acts or any of them.

18. Any notice request or consent (whether expressed to be in writing or not) to be given by the Postmaster-General under these presents may be under the hand of any one of the Secretaries or Assistant Secretaries for the time being of the Post Office, and may be served by sending the same in a registered letter addressed to the Licensee at the usual or last known place of residence or business of the Licensee, and any notice to be given by the Licensee under these presents may be served by sending the same in a registered letter addressed to the Secretary of the Post Office at the General Post Office, London.

THE SCHEDULE.

1.	Normal Range of Signalling.		Character of Apparatus.		6. Power.		7.
Name of Station.	2. By Night.	3. By Day.	4. Description of Receiving Apparatus.	5. Wave Lengths (in Metres).	Source and Maximum Output.	Maximum to be taken by Transmitting Instruments.	If Alternator is used, No. of Cycles per Second.

IN October, 1912, the Board of Trade, at the request of the Lords Commissioners of the Admiralty, issued a notice directing the attention of Masters and Owners of British Merchant Vessels to the necessity for arranging for periodical practices in Wireless Tele-

graphy communications between H.M. Ships of War and Ships of the British Mercantile Marine for the purpose of ensuring efficient and reliable communication when required.

The co-operation is invited of all British ship-owners and masters whose ships are fitted with Wireless Telegraphy, in order to give effect to the following proposals :—

(1) At 8.30 a.m. and 2.30 p.m. daily any single man of war (destroyers and small craft excluded) or one man of war in a fleet in company, detailed by the Senior Naval Officer present, will adjust her Wireless Telegraphy transmitting and receiving apparatus to the commercial 600 metre wave-length and make the call "CCCC," followed by her own commercial call sign, indicating that she is prepared to carry out an exercise with any British merchant ship within range.

On a British merchant ship receiving this call she will answer and say whether or not she is prepared to proceed with the exercise. Should more than one merchant ship answer, the man of war will indicate which is to exercise and which is to wait.

The exercise will then proceed, but no messages are to be exchanged which are not authorised by the respective captains and masters of the ships practising. No message received during such exercises is to be forwarded beyond the ship actually receiving the message and no payment for any message can be made. The exercises are to be considered as strictly on Service and not for any commercial advantage.

(2) In all such exercises the man of war is to be considered the controlling ship.

(3) The exercises will cease at 9.15 a.m. and 3.15 p.m. respectively, or before, at the discretion of the captains concerned.

(4) These exercises are only to be carried out between vessels, neither of which are within 150 miles range of any commercial shore station using the 600 metre wave-length, and are to cease at once should one of H.M. ships so direct.

MERCHANT SHIPPING (CONVENTION) ACT, 1914.

G AN Act to make amendments of the law relating to Merchant Shipping as are necessary or expedient to give effect to an international Convention for the Safety of Life at Sea, signed in London on January the twentieth, nineteen hundred and fourteen, and for purposes incidental thereto.

(10th August 1914.)

PART III.

(*Which deals with Wireless Telegraphy.*)

15. (1) Subject to the provisions of this Act, every British ship registered in the United Kingdom which carries 50 or more persons shall be provided with a wireless telegraphy installation, and shall maintain a wireless telegraphy service which shall be at least sufficient to comply with the rules made for the purpose under this Act, and shall be provided with certified operators and watchers at least in accordance with those rules. Provided that the obligations imposed by this section shall not come into operation until such date, not being less than six months after the making of those rules, as may be specified in the rules.

(2) In reckoning the number of persons carried on a ship for the purpose of this section, persons shall not be counted who are exceptionally and temporarily carried on a ship—

(*a*) As the result of *force majeure;* or

(*b*) as the result of the necessity of increasing the number of the crew to fill the places of members of the crew who are ill or disabled; or,

(*c*) as the result of the obligation on the part of the master to carry shipwrecked persons, or persons in like circumstances; or,

(*d*) if so provided by rules of the Board of Trade, as cargo hands for a part of the voyage not being between one continent and another, and not being, during the time the hands are carried, outside the limits of latitude thirty degrees north and thirty degrees south.

(3) If this section is not complied with in the case of any ship, the master or owner of the ship shall be liable in respect of each offence to a fine not exceeding five hundred pounds, and any such offence may be prosecuted summarily, but if the offence is prosecuted summarily the fine shall not exceed one hundred pounds.

16. (1) The Board of Trade, in consultation with the Postmaster-General, shall make such rules with respect to wireless telegraphy installations and service on British ships which are registered in the United Kingdom and with respect to the carrying on those ships of operators and watchers for the purposes of wireless telegraphy, as appear to them necessary or expedient to carry into effect the provisions of the Convention mentioned in Part V. of the Third Schedule to this Act.

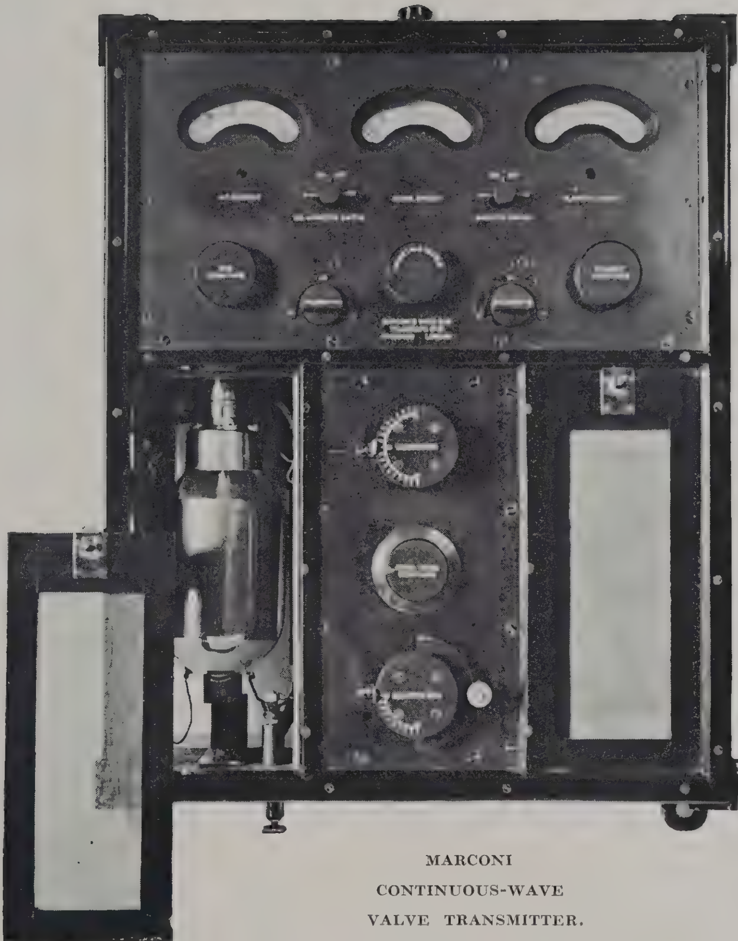
(2) The Board of Trade may by rules made under this section exempt from the obligations of this Act as to wireless telegraphy—

(*a*) Ships while on voyages the course of which does not take the ship more than a hundred and fifty sea miles from the nearest coast, if the Board are satisfied that the route and the conditions of the voyage are such as to render compliance with those obligations unreasonable or unnecessary; and,

(*b*) sailing ships on which, owing to the peculiar or primitive nature of their build, it is impossible to provide a proper wireless telegraphy installation.

(3) The Board of Trade may by rules made under this section provide that any automatic calling apparatus which is certified by them to be efficient and to have been accepted by the parties to the Convention may be substituted, for the purposes of the provisions of this Act and any rules made thereunder relating to wireless telegraphy, for a certified operator or watcher.

17. The Board of Trade may postpone the operation of the provisions of this Act relating to wireless telegraphy as respects any particular ship for such period as the Board of Trade determine in each case, if it is shown by the owners of the ship that they have taken all reasonable steps to comply with the provisions of this Act as respects the ship, but that they have been unable to do so owing to difficulties in obtaining delivery of any wireless telegraphy apparatus or of obtaining the service of certificated operators or watchers.



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[*To face page* 240.

The period of postponement under this section shall not exceed one year in the case of ships which are required in pursuance of the Convention to provide a first-class wireless telegraphy service, and two years in the case of ships which are so required to provide a third-class wireless telegraphy service, and in the case of ships which are so required to provide a second-class wireless telegraphy service, shall not exceed one year as respects the provision of a wireless telegraphy installation and two years as respects the provision of a continuous watch.

(*The coming into operation of this Act has been postponed.*)

SUPPLEMENT TO *THE LONDON GAZETTE* OF FRIDAY, THE 31ST OF JULY, 1914.

Sunday, 2nd August, 1914.

GENERAL POST OFFICE.

H In pursuance of Regulation 5 of the Wireless Telegraphy (Foreign Ships) Regulations, 1908, I, the Right Honourable CHARLES EDWARD HENRY HOBHOUSE, His Majesty's Postmaster-General, do hereby give notice that in the opinion of the Right Honourable REGINALD McKENNA, one of His Majesty's Principal Secretaries of State, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, and that the use of wireless telegraphy on board foreign ships whilst in the territorial waters of the British Isles will be subject to such rules as may be made by the Admiralty.

Dated this First day of August, 1914.

EXTRACT FROM *THE LONDON GAZETTE*, 4TH AUGUST, 1914.

Admiralty, S.W., 3rd August, 1914.

With reference to the notification published by the Postmaster-General on the 2nd instant, the following regulations have been made by the Lords Commissioners of the Admiralty prohibiting the use of wireless telegraphy by merchant vessels in the territorial waters of the United Kingdom and Channel Islands:—

1. The use of wireless telegraphy is prohibited in the harbours and territorial waters of the United Kingdom and Channel Islands.

2. On entering any port or harbour or on directions being given to that effect by any naval, military, examination service, Customs or police officer, the aerial wire or antenna is to be at once lowered, disconnected from its halliards, and from the operating room, and is not to be rehoisted while the ship remains in English territorial waters.

3. Any breach of these regulations renders the masters of offending ships liable to penalties and to the confiscation of the wireless apparatus of their ships.

Note.—These regulations do not apply to ships owned (not chartered) by the Admiralty, whether they fly the Blue or the Red Ensign.

By Command of Their Lordships,

W. GRAHAM GREENE.

EXTRACT FROM THE DEFENCE OF THE REAM (CONSOLIDATION) REGULATIONS, 1914.

22. No person shall, without the written permission of the Postmaster-General, make, buy, sell, or have in his possession, or under his control, any apparatus for the sending or receiving of messages by wireless telegraphy, or any apparatus intended to be used as a component part of such apparatus; and no person shall sell any such apparatus to any person who has not obtained such permission as aforesaid, and any person having in his possession or under his control any such apparatus, whether with or without the permission of the Postmaster-General, shall on demand deliver the apparatus to the Postmaster-General, or as he may direct; and if any person contravenes the provisions of this regulation he shall be guilty of an offence against these regulations.

If the competent naval or military authority has reason to suspect that any person having in his possession any apparatus for sending or receiving messages by telegraphy, wireless telegraphy, telephony, or other electrical or mechanical means is using, or about to use, the same for any purpose prejudicial to the public safety or the defence of the realm, he may, by order, prohibit that person from having any such apparatus in his possession, and may take such steps as are necessary for enforcing the Order, and if that person subsequently has in his possession any apparatus in contravention of the Order he shall be guilty of an offence against these regulations.

For the purposes of this regulation any apparatus ordinarily used as a distinctive component part of apparatus for the sending or receiving of messages by wireless telegraphy shall be deemed to be intended to be so used unless the contrary is proved.

EXTRACT FROM *THE LONDON GAZETTE*, DATED 28TH JULY, 1916.

Whereas by an Order in Council dated the twenty-eighth day of November, nineteen hundred and fourteen, His Majesty was pleased to make regulations (called the "Defence of the Realm (Consolidation) Regulations, 1914") under the Defence of the Realm Consolidation Act, 1914, for securing the public safety and the defence of the realm:

And whereas the said Act has been amended by the Defence of the Realm (Amendment) Act, 1915, the Defence of the Realm (Amendment) (No. 2) Act, 1915, and the Munitions of War Act, 1915:

And whereas the said regulations have been amended by various subsequent Orders in Council:

And whereas it is expedient further to amend the said regulations in manner hereinafter appearing:

Now, therefore, His Majesty is pleased, by and with the advice of His Privy Council, to order, and it is hereby ordered, that the following amendments be made in the said regulations:

N.B.—Paragraphs 1, 2, 3, *and* 5 *of this Statutory Order deal with matters other than Radiotelegraphy, to which Clause* 4, *which follows, alone refers.*

4. After regulation 37A the following regulation shall be inserted :—

" 37B (1) Every British ship of three thousand tons gross tonnage or upwards in respect of which a licence to instal wireless telegraph apparatus has been granted by the Postmaster-General, and which puts to sea from a port in the United Kingdom after a date to be specified in such a licence, shall be provided with a wireless telegraph installation, and shall maintain a wireless telegraph service, and shall be provided with a certified operator, together with suitable accommodation for the apparatus and operator :

" Provided that where a licence has been granted in respect of a ship before the making of this regulation, this obligation shall apply as if the twenty-first day of August, nineteen hundred and sixteen, were the date specified in the licence.

" (2) Application to the Postmaster-General in a form prescribed by him for such a licence shall, unless a licence has before the making of this regulation been granted in respect of the ship, be made—

(*a*) in the case of a ship of such tonnage as aforesaid registered in the United Kingdom, by the owner thereof on or before the twenty-first day of August nineteen hundred and sixteen ; and

(*b*) in the case of a British ship of such tonnage as aforesaid, registered elsewhere than in the United Kingdom, by the master of the ship within two days from the arrival of the ship in the United Kingdom next after the making of this regulation.

" (3) The Postmaster-General shall, as and when wireless telegraph apparatus and the services of operators become available for the purpose, cause licences to be issued in respect of such ships as in the opinion of the Admiralty should in the national interests be fitted with such apparatus, and the licences shall specify the date as from which the carrying of such apparatus under this regulation is to be compulsory, the character of the apparatus, and the qualifications of the operator.

" (4) The Postmaster-General may—

(*a*) extend the time mentioned in the licence as the time within which any apparatus is to be provided ; and

(*b*) exempt any ship from the obligations imposed by this regulation.

" (5) If the provisions of this regulation or the terms of any licence granted thereunder are not complied with in the case of any ship, the master or owner of the ship shall be guilty of a summary offence against these regulations, and if any master or owner fails to make an application in accordance with this regulation he shall be guilty of a summary offence against these regulations, and in either case if the ship is at any time subsequently found at a port of or within the territorial waters adjoining the United Kingdom, the ship may be seized and detained.

" (6) In this regulation expressions have the same meaning as in the Merchant Shipping Acts, 1894 to 1914."

GRENADA

The Wireless Telegraph Ordinance, 1903.

IN this Ordinance the term "Wireless Telegraphy" means any system or installation designed or constructed for the transmission or receipt of any messages or communications to or from a distant place by means of electric currents and signals generated by any apparatus or instrument which system, installation or instrument is unconnected by wire or other tangible attachment with such distant place. The term "Wireless Telegram" means any message or communication transmitted, or intended for transmission, by Wireless Telegraphy.

2. The Governor in Council and the servants of the Government of the Colony shall have the exclusive privilege of installing, erecting, maintaining, and using in this Colony apparatus intended for Wireless Telegraphy, and also the incidental services of transmitting, receiving, collecting or delivering Wireless Telegrams.

3. It shall not be lawful for any person to instal, erect, maintain or use in this Colony any apparatus or instrument for the purpose of Wireless Telegraphy without having previously obtained from the Governor a licence in that behalf to be granted on such terms and conditions as the Governor may prescribe.

4. Any person contravening the provisions of this Ordinance shall be liable on conviction to a fine not exceeding Fifty Pounds, and the apparatus and installation in respect of which a conviction is obtained may by order of the Magistrate before whom such conviction is obtained be forfeited to the use of His Majesty the King.

5. All proceedings under this Ordinance may be taken before the Magistrate of the Southern District or any other person appointed by the Governor for the purpose of hearing and deciding the case; and the mode of procedure shall be according to the law in force for the time being in respect of other offences punishable on summary conviction.

6. This Ordinance may be cited as "The Wireless Telegraph Ordinance."

HAITI.

THE Republic of Haiti does not possess a system of Wireless Telegraphy current in the Island. The number of radiotelegraphic stations exist at Port au Prince and in the other chief cities, but they all constitute items in the American occupation. Consequently there are at present no official regulations of the Republic covering the subject.

HOLLAND

See Netherlands.

HUNGARY

THE following is a copy of an Order issued by the Royal Hungarian President of the Board of Trade in 1912 in respect of wireless telegraphic equipments on Hungarian Ocean-going Passenger Ships.

In accordance with Sections 24 and 27 of the appendix to my Order No. 60805, dated August 21st, 1912, concerning measures of safety for and equipment of sea-going merchant ships before they are

allowed to be on active service: all passenger vessels which are already in active service, liners running to time-table from Hungarian ports further than Gibraltar or Aden carrying passengers, at latest by February 1st, 1915, and all new ships before they go into active service must be fitted with such radio-telegraphic apparatus as is able to give and receive messages under normal conditions at a distance of 100 nautical miles at least.

That this Order may be carried out, I issue the following instructions:

(1) The shipowner must apply for the permission of the Royal Hungarian President of the Board of Trade to provide a wireless station on board. The application must be accompanied by a technical description of the apparatus and four drawings. The previous permission of the Royal Hungarian President of the Board of Trade must be applied for and received in case of any change of system or of any other alteration which affects the ability of the apparatus to receive and send messages.

(2) The equipment of the station must be such that it shall conform to section 3 of the London Radio-Telegraphic Convention, and it must be able to work in conjunction with other radio-telegraphic stations of a different system—*i.e.*, it shall be able to send and receive messages from them and it must be abreast of the latest developments of technical progress. The previous approval of the Royal Hungarian President of the Board of Trade is necessary for the choice of the system to be applied.

The apparatus must be such that it shall be possible to tune to 300 metres as well as 600 metres wave-length and with these it shall be possible to send and receive at least 20 words per minute, counting the words at 5 letters each. The station, in accordance with the London International Radio-Telegraph Service Rules XXXV. s. 2 a-d, may also use a wave length of 1,800 metres.

(3) The necessary machines and materials for the equipment of the station, if possible, must be acquired in Hungary. Such materials and machines brought from foreign countries can only be used by special permission of the Royal Hungarian President of the Board of Trade. The auxiliary books and similar official equipment will be supplied at cost price by the General Manager of the Royal Hungarian Post and Telegraph Offices.

(4) All vessels which have a permanent Radio-Telegraphic Station, also those which have limited service in accordance with the London Radio-Telegraph Service Rules s. XI. must have an auxiliary radio-telegraphic equipment fitted in the manner determined by the Royal Hungarian President of the Board of Trade.

This auxiliary equipment must be provided with its own special power supply, which must be absolutely independent of all the other (not radio-telegraphic) power supply equipments of the ship and it must be such that it shall be possible to put it into active service quickly; it shall work for at least six hours and it must be suitable for a range of 80 nautical miles in case of a station in permanent service and 50 nautical miles in case of a station with a limited service.

This special auxiliary equipment can be dispensed with on ships where the regular radiotelegraphic equipment satisfies all requirements.

(5) The speed of transmission and reception will be fixed by the

Royal Hungarian President of the Board of Trade in the licence to be issued.

In case of new inventions which promote the reliability and speed of sending and receiving messages to a considerable degree, the Royal Hungarian President of the Board of Trade may compel the shipowner after due and fair consideration of all practical conditions and of cost to apply the new invention on the station within a fixed period.

(6) The electric power used at the radio-telegraphic apparatus must not exceed one kilowatt under normal conditions, and greater power can only be applied in case communications have to be exchanged at a longer distance than 200 nautical miles from the nearest shore station or when by reason of obstacles this greater increase of power is necessary.

(7) The station may be examined and its working controlled by the employees of the General Manager of the Royal Hungarian Post and Telegraph Offices at any time. The shipowner must grant facilities to individuals proposed by the General Manager of the Royal Hungarian Post and Telegraph Offices as well as to the members of the Imperial and Royal Navy through the intermediary of the General Manager of the Royal Hungarian Post or Telegraph Offices to become acquainted with the working of the station, this extending to all particulars, and that they shall acquire the necessary experience.

The shipowner may not agree to any such conditions which the supplier of the equipment might make as that the equipment or any part of it must be kept secret as regards the deputies of the General Manager of the Royal Hungarian Post and Telegraph Offices and of the Imperial and Royal Navy who cannot be excluded.

The shipowner is obliged to carry without charge in classes according to their rank (including the use of sleeping cabins) persons sent for controlling and studying and must provide them with food at his own charge. For each voyage, however, only two such individuals can be sent.

(8) The Royal Hungarian President of the Board of Trade will determine in the licence the character of the service of the deck station (public, special destination, etc.) and duration (continuous, limited service), the number of operators to be employed and also their qualification in classes I. and II.

(9) The Royal Hungarian President of the Board of Trade reserves the right to suspend at any time the use of the deck-station for an indefinite period or for ever, or in respect of certain specified communications, without giving any reason or indemnity.

In case of mobilisation ordered in the Monarchy of Austria-Hungary or of war, if the commander of the vessel does not receive from the General Manager of the Royal Hungarian Post and Telegraph Offices instructions to the contrary, the station must be put absolutely out of use.

The commander of the ship is responsible for carrying out this rule.

In all other respects the shipowner must comply with the special instructions received in case of mobilisation or war.

(10) The radio-telegraph operators must be Hungarian citizens with an unimpeachable record, who are able to speak or write the Hungarian language perfectly and who have received a diploma from

the examining commission sent out by the Royal Hungarian President of the Board of Trade that they thoroughly understand how to handle the radio-telegraphic apparatus.

Persons who receive this diploma must take before the examining commission an oath of fidelity to observe their duties and obligations to the service, and amongst these latter they must swear to keep all telegrams secret, which the written certificate will testify.

The employees of the station are subject to the ship's discipline; they must have a "ship service" book and must be included in the list of the crew (or staff).

The shipowner may train for the radio-telegraphic service only such persons whose training has been sanctioned by the General Manager of Post and Telegraph Offices.

Any radio-telegraphic employee whose diploma is cancelled by the General Manager of the Royal Hungarian Post and Telegraph Offices must be dismissed at once.

The shipowner must report to the General Manager of the Royal Hungarian Post and Telegraph Offices and to the Royal Hungarian Naval Authority immediately every change which occurs in the staff of the radio-telegraphic service.

(11) On payment of the regular fees anyone may use such stations for telegraphing as are equipped for public service.

The station fee to be charged must be submitted by the Company to the Royal Hungarian President of the Board of Trade and fixed by him.

The shipowner is entitled to this station fee.

(12) The shipowner is responsible for the telegraphic fees which are due to the Home and Foreign Telegraph Offices from the proceeds of the ship station telegrams. The shipowner—*i.e.*, the deck station—may communicate with foreign Telegraph Authorities and also with the Berne International Telegraph Association Bureau about matters concerning administration only through the General Manager of the Royal Hungarian Post and Telegraph Offices.

(13) The station must enter into communication for exchange of radio-telegrams with all shore and ship stations without regard to the system they use and they must also accept distress signals coming from anywhere and answer them and make the necessary arrangements.

The ship station must have special consideration for the shore station. The ship station must be kept continually in good condition with a view of exact and proper communication with shore stations.

If it is the wish of the shore station, the ship station shall interrupt its communications at once.

(14) With regard to the working of the ship station and the accounting for the fees: the London Radio-Telegraph Agreement and the Service Rules connected herewith, the St. Petersburg Telegraph Agreement and the Service Rules connected with it, as well as the orders of the General Manager of the Royal Hungarian Post and Telegraph Offices whether already issued or still future must be followed.

The ship station—*i.e.*, its owner—must comply with the legislative decisions and regulations concerning telegraph offices, telephones, and electric signals.

In foreign waters they must comply not only with the International Radio-Telegraph Agreement and Service Rules, but also with the

special rules (if any) in that particular country. It is the duty of the shipowner to acquaint himself with these.

(15) As an acknowledgment of the right reserved to the State the shipowner must pay at the date mentioned in the licensing document and in cash 20 kronen annually per station and a controlling fee of 30 kronen.

In case an investigation should become necessary in consequence of the negligence or fault of the shipowner or his employee, and the investigation should find the shipowner or his employee guilty, the shipowner shall refund to the Treasury the entire cost of the investigation.

(16) As a penalty for negligence or mistakes committed in connection with the Radio-Telegraph service—in case it is neither transgression nor criminal—the General Manager of the Royal Hungarian Post and Telegraph Offices can fine the shipowner any sum up to K. 100.

(17) If the ship station does not fulfil its obligations, though repeatedly warned, or if the use of the station is directed against public interest, the Royal Hungarian President of the Board of Trade has the right to apply a penalty of K. 100 up to K. 1,000, or give instructions that a deputy sent out by him shall manage the station service at the expense and risk of the shipping company, and the necessary alterations shall be made at the expense of the shipowner, in order to put a stop to the deficiencies in the deck station equipment, or else he may suspend or withdraw the licence for the telegraph outfit.

(18) The licence for the equipment and upkeep of the Radio-Telegraph station cannnot extend to a longer period than twenty years. After expiry of the period fixed in the licence the equipment, together with the whole appurtenances (furniture, articles of equipment), and together with the auxiliary equipment (if any) shall pass into the ownership of the Royal Hungarian Post in good and serviceable condition, without any charge and free from any liability thereon.

If the Royal Hungarian Post does not desire to take over the station, which thus passes into its ownership, but cedes it for further use to the shipowner, the shipowner must pay 20 kronen, together with and additional to the fees mentioned in section 16, as an acknowledgment of the fact that the ownership of the equipment has been acquired by the State.

Regarding vessels which are withdrawn from service, the licensing document concerning the ship station becomes void, and the shipowner must report this to the General Manager of the Royal Hungarian Post and Telegraph Offices. The transferring of the Radio-Telegraph equipment to another vessel necessitates a new licence.

(19) The Royal Hungarian President of the Board of Trade has the right to take over into State management temporarily or permanently any ship station whenever he chooses without giving a reason, before the licence expires, or to dismantle it.

In case it is temporarily taken over the owner must hand over for use free, and without claim for indemnity, the Radio-Telegraph apparatuses, all necessary articles of outfit for the upkeep and the supplies, as well as the official room and the operators' cabins; he

must supply the necessary power for telegraphing, and to the operators services in kind all free of charge (board, medical treatment, service, etc.). On the other hand, the ship fees are due to the shipowner.

The conditions of the definite taking possession will be laid down by an order to be issued and also by the licensing document.

The definite occupation must take place under normal conditions after six months' notice, but the Royal Hungarian President of the Board of Trade reserves the right in the public interest to reduce this period or take over the station at any time without giving notice.

(20) In the public interest, as to which the Royal Hungarian President of the Board of Trade shall be the sole judge, the General Manager of the Royal Hungarian Post and Telegraph Offices—with the exclusion of every claim for indemnity which can be realised by legal means—can take measures for fitting out any kind of vessel with radio-telegraph at the expense of the Treasury, for the upkeep of the same, and, when the public interest does not demand it any more, for the dismantling of the same; and also to make regulations for refunding a certain indemnity to the owner of the vessel which arises out of this.

(21) The Royal Hungarian President of the Board of Trade reserves the right to make exceptions in certain cases under above rules according to practical requirements.

INDIA.

THE Administration of Wireless Telegraphy in India is controlled by the Director-General of Posts and Telegraphs, assisted by the Chief Engineer of the Telegraphs Department. Immediately subordinate to these are the Directors of Telegraph Engineering of the Northern, Eastern, and Southern circles, the Postmaster-General and the Director of Telegraph Engineering at Burma. There are, in addition, Superintendents of Telegraph Engineering in charge of the Telegraph Divisions where Wireless Stations are situated. There are now eighteen wireless telegraph stations in India, of which nine are open to general public correspondence.

The Government of India have decided that the granting of licences to military officers in respect of wireless telegraph apparatus used for experimental purposes shall be regulated by the following general principles :—

(1) When an officer conducts experiments in wireless telegraphy in his official capacity at the expense of Government no licence is required, but only executive permission, which may be given so far as the Telegraph Department is concerned by the Director-General, Posts and Telegraphs.

(2) When an officer carries on experiments as a private individual at his own expense he must obtain a licence. If the approval of the military authorities is required to what he proposes to do he should obtain such approval before the Director-General, Posts and Telegraphs, is approached. The licence will then be submitted by the Director-General, Posts and Telegraphs, for the sanction of the Government of India.

(3) With reference to the above, attention is drawn to the necessity for applying for licences to own and use wireless telegraphy apparatus or installations, experimental or otherwise. Applications for such licences will be submitted through the Chief of the General Staff and will contain particulars regarding the apparatus, showing (*a*) system it is proposed to employ, (*b*) maximum range of signalling with applicants' own receiving apparatus, (*c*) power (current and voltage), (*d*) source of power.

At present it is only possible to add, to the above, the notation that, during the continuance of the present war, no licences to work Wireless Telegraphy are issued, and no experiments are permitted by private individuals.

ITALY

A—Law of 30th June, 1910, No. 395.
B—Regulations (No. 227) of April, 1912.
C—Law of 30th June, 1912.
D—Decree No. 1587, dated 12th November, 1916.

WIRELESS Telegraph land stations in Italy belong to and are operated by the Ministry of the Navy, and the department having special charge of the wireless telegraph service is the Department of Artillery and Armaments.

In addition to the Ministry of the Navy, the Ministry of War and the Ministry of Posts and Telegraphs also have special departments for Wireless Telegraphy.

A The following is known as the Law of 30th June, 1910, No. 395:—

Art. 1.—The establishment and exploitation of the radiotelegraphic and radiotelephonic installations are reserved to the Government, and in general of all those for which, in the State and in the Colonies, on land and on board ship, energy is employed in order to obtain distance effects without the use of conducting wires.

The Government has the right to grant to any person, public or private scientific or training institution, the authority to establish and to exploit installations of such a nature on land and on the passenger and mercantile vessels, for which previous concession must be obtained.

The licence may be revoked upon the recommendation of the consulting Commission when the installations cause interruption of State stations which were in operation prior to the concession, or when they do not comply with the technical conditions established in the licence.

The exploitation of the installations granted can be revoked, suspended, or taken over by the Government in time of war or during peace whenever the Government may deem it necessary and opportune.

The Government has also the right to inspect, through its officials, those stations which are not the property of the State, in order to ascertain whether the stations are operated in accordance with the regulations.

Art. 2.—The Government administrations concerned in these services are the Ministry of Posts and Telegraphs, of War and the Admiralty; and special regulations determine the share of the respective departments in the execution of the present law.

A permanent consultive commission is constituted to give opinions upon international agreements, questions of a scientific nature, and upon doubtful points relating to the said services.

The commission shall also decide every doubtful case which may arise of a technical character regarding the installation and exploitation of the concessions according to Art. 1.

The commission shall be qualified to determine the power of the radiotelegraphic and radiotelephonic apparatus and technical and economic details for their use on vessels engaged in emigration traffic, when the said apparatus has been installed by the Government according to Art. 11 of the Royal Decree, 14th March, 1909, No. 130.

Questions concerning indemnity on account of the cancellation of a licence, suspension of exploitation, or redemption as per Art. 1, shall be referred to an arbitration tribunal, which shall decide, without right of appeal. This tribunal shall be composed of three members, one nominated by the Government, one by the licensee, the third by the President of the Tribunal in Rome. The Government can leave to the said Commission the selection of its own arbitrator.

Where several licensees are interested parties to a dispute, and they are unable by mutual agreement to nominate an arbitrator, each shall submit the name of an arbitrator, and the choice will be made by drawing lots in the presence of a judge of the Tribunal of Rome.

The composition of the Commission in the present article and the rules of its working have been determined in the regulations.

Art. 3.—Every infringement of Art. 1 of the present law is punishable by a fine up to £ It. 2,000, and with imprisonment up to one year, which penalties may be imposed separately and together according to the circumstances. It is in the power of the judge to add to the said penalties the confiscation of the apparatus.

During criminal proceedings the Administration can, in virtue of decree by the prefect, and at all times that in the opinion of the prefect would be in the public interest, obtain immediate possession of the installation and provide if necessary for its removal.

Any person will incur the same penalties if he should avail himself of the installation on board commercial or passenger vessels when they are at anchor in the State waters, except in case of danger or other special cases, which will be dealt with in the regulations.

Art. 4.—If any person shall cause damage or deterioration to installations, or in any other manner interrupt, or cause interruption of the service, even temporarily, he will be liable to the penalties laid down in Art. 315 of the Penal Code, except in the case of military interference with military stations, for which offence the penalties stated in the Penal Code will be imposed.

If any person should abuse the use of the alarm signal of the vessels in danger, he will be subject to the same penalties.

Art. 5.—The penalties established by the present law are understood

to be applicable, without prejudice to greater offences which may take down in Art. 315 of the Penal Code, except in the case of military Penal Code.

B THE following regulations (No. 227) were published in April, 1912, for carrying out the Act of June 30th, 1910 (No. 395):—

Section I.

1. The Ministry of Posts and Telegraphs shall have under its control:—

(*a*) The installation and exploitation of the stations for public service and constituting the interior net-work of the State and of all those opened for international communication.

(*b*) The verifications, inspection and control of the material and working of the service of all the land installations exploited in virtue of Government licence.

(*c*) The tariff regulation for communication between all land stations and ship and shore stations, also accounting.

The Ministry of War shall have under his control:—

The installation and working of stations destined exclusively to the military service, including movable field stations for use in the R. Army. In time of war the management of the service (either a part or all the stations destined to the public service) can be taken over by the military administration.

The Admiralty shall have under its control:—

The installation and exploitation of the ship stations of the Royal Navy, private and mercantile; the verifications, inspections and control of the materials and of the working of the service of the installations made for passenger and mercantile traffic.

Section II.

2. *Permanent Consulting Radiotelegraphic Commission.*—The Permanent Consulting Commission is composed of a President not belonging to the Government Administration, two members selected amongst persons of well-known ability in electric and radiotelegraphic science, a superior officer of the Royal Navy attached to the General Staff, and a superior officer attached to the office of the Chief of the General Staff of the Royal Navy.

The following are members of the Commission by right:—

(1) The Director of Posts and Telegraphs Higher Institution.

(2) The Director in Chief of the Radiotelegraphic Department of the Posts and Telegraphs.

(3) The Officer-Director of the Radiotelegraphic Department in the Army Office of Rome.

(4) The Superior Officer of the General Staff of the Royal Navy, Chief of the Department of the Submarines, Electric material and Radiotelegraphic Service at the Admiralty.

Three members, selected amongst the three mentioned Administrations, will act as Secretaries.

3. The President, members and secretaries will be nominated by Royal Decree, proposed, by common accord, by the Ministers of the Posts and Telegraphs, Admiralty, and War.

By Ministerial decree extraordinary members, without vote, can be added temporarily, these to be selected from persons of well-known skill, proposed by the President of the Commission.

4. The Commission shall have its office at the Admiralty in Rome. The meetings of the Commission are to be convened by the President at the request of the interested Administrations.

5. The opinion of the Consulting Commission can be asked on the following subjects:—

(*a*) On the compilations of arrangements and special rules for the technical organisation of the radiotelegraphic and radiotelephonic service of the State, as well as for practical rules for the constitution and exploitation of the installations.

(*b*) On all questions of a scientific nature, and doubtful cases referring to the radiotelegraphic and radiotelephonic services.

(*c*) On International Conventions.

(*d*) On technical conditions with reference to licences of radiotelegraphic and radiotelephonic stations.

(*e*) The establishment, before granting the licence, of indemnity due in case the installation should be repealed, suspended, or taken over by the State according to paragraph III., Art. I. of the law.

(*f*) Repeal of the licences.

(*g*) On the adoption of new radiotelegraphic and radiotelephonic systems, and on the application of same by the Government service, unless they should deal with interesting systems concerning the defence of the State.

The qualified Administrations may whenever they think it warranted ask the opinion of the Commission on any subject.

The Commission is entitled to avail itself for its own study of the working rooms and of the Government experimental stations, but a previous application must be lodged with the Administrations.

6. The expenses for the working of the Commission are to be divided amongst the three Administrations interested.

Section III.

7. *Licences for the Exploitation of Radiotelegraphy and Radiotelephony.*—Licences to persons, to institutions, and to public and private Administrations for the installation of any radiotelegraphic or radiotelephonic station will be granted in virtue of an agreement containing the conditions to be observed, by a decree issued by the Ministry of the Posts and Telegraphs, acting in harmony with the Ministry of War and the Admiralty.

Such licences cannot last longer than the 16th February, 1917. After this period the licence can be renewed.

8. Licences for radiotelegraphic stations for private use are limited to private correspondence between properties of the same licensee or between properties of two licensees, all correspondence with

third persons being absolutely excluded. Such licences are exempted from tax when the stations are constructed on private property and work over all the territory dividing the stations, without interruption by public land.

Licensees are also exempted from taxes which are granted for installation of radiotelegraphic and radiotelephonic stations having for object a scientific or educational purpose.

9. All applications for licences for radiotelegraphic and radiotelephonic installations must contain :—

(*a*) The exact indication of the person or institution making the application and their legal residence.

(*b*) The nature and purpose for the licence, the place or places where it is proposed to instal the station or stations, and their presumed zone of service.

(*c*) The detailed plans for the construction and technical quality of the installation, indicating in a detailed manner the nature and power thereof.

(*d*) The period for which the licence is asked.

(*e*) The period required before starting the station.

(*f*) The receipt of the amount to constitute the deposit-guarantee, as per Art. 13 and 14.

Such a deposit must be paid to the cashier of the local Provincial Direction of Posts and Telegraphs by the applicant for the licence.

10. Every contract by the licensee, having for object the hire, amalgamation, partial or complete transference of the licence or licences, cannot take place before obtaining in advance the approval of the Government.

11. The licence is considered as expired should the licensee fail to complete and have ready for service the radiotelegraphic or radiotelephonic installation within the time stipulated as per paragraph (*e*) Art. 9.

The licence is considered as expired on the death of the licensee.

12. The officials of the State Telegraphic Administration shall be responsible for the maintenance of the installation and proper up-keep of the radiotelegraphic and radiotelephonic land stations for which a licence is granted; they shall satisfy themselves that the licensee observes the law and the present regulations and that the licensee fulfils all the obligations imposed upon him by his contract with the Government.

13.—Every licensee for a radiotelegraphic or radiotelephonic installation for private use, excepting the cases considered in Art. 8, will pay in advance to the State an annual fixed tax of £It.50.

To guarantee the said tax the licensee must make a deposit as guarantee equal to the amount of fixed tax for one year.

14. Every licensee for radiotelegraphic or radiotelephonic installations for public use will pay every year to the State in quarterly instalments a tax corresponding to 10 per cent. of the revenue from radiotelegraphic or radiotelephonic charges on the basis of the common tariff.

To guarantee the said tax the licensee will make a deposit as guarantee of not less than £It.200. If after one year the guarantee shows to be less than the amount due to the State for one year, then the deposit must be brought to the level of such proportion.

15. The period of the licence and the obligation of the tax established by Articles 13 and 14, begin from the month following the decree granting the licence.

16. The deposits as per Articles 13 and 14 will be forfeited to the public exchequer in case of withdrawal or termination of a licence.

Should the licensee fail to provide for the payment of the taxes due as per Articles 13 and 14, the Government will apply the deposit, which should be increased in its integral amount within ten days of the said confiscation.

Section IV.

17. *Qualifications for the Radiotelegraphic and Radiotelephonic Service.*—The staff necessary for the management and working of the radiotelegraphic and radiotelephonic service is appointed as follows:

(*a*) For the stations under the control of the Ministry of Posts and Telegraphs, from amongst the officials of specialists of first, second, third and fourth class.

(*b*) For the stations under the control of the Ministry of War, amongst the officers and privates of the engineers of the R. Army.

(*c*) For the stations under the control of the Admiralty, from amongst the officers of the staff and the marines.

Should it at any time be found convenient to the management and working of the above-mentioned stations, a mixed staff selected from the three Administrations can be employed.

The Ministry of the Posts and Telegraphs can for an educational purpose always send its own staff to the radiotelegraphic and radiotelephonic commercial stations by making previous arrangements with the interested Administration.

18. The staff to be employed in the radiotelegraphic stations licensed to private persons must possess a certificate proving their professional ability.

Such a document is granted either by the Ministry of Posts and Telegraphs, or by the Admiralty, according to the service for which it is intended.

Section V.

19. *Limitations to the use of Radiotelegraphic and Radiotelephonic Apparatus.*—Cargo and passenger vessels are prohibited from using their own radiotelegraphic or radiotelephonic stations when they are at anchor in the State waters, except in cases of giving warning of danger or appeals for help, or when they are about to sail, or for urgent reasons within half an hour after their arrival and when the communication with the land is cut off for special reasons or for sanitary measures.

A breach of this rule will render the transgressor liable to the penalties imposed by Article 3 of the law.

Section VI.

20. *Taxes.*—The land tax for one radiotelegram is composed:

(*a*) Of the radiotelegraphic tax due to the coast station;

(*b*) Of the radiotelegraphic tax due to the station on board;

(*c*) Of the telegraphic tax.

For taxation purposes only those radiotelegrams exchanged with Board stations are considered.

21. All the radiotelegraphic and radiotelephonic stations installed before the promulgation of the law must apply for a licence within one calendar month of the present regulation.

C The following paragraph relating to Wireless Telegraphy is taken from the "Law of 30th June, 1912," which contains regulations concerning marine, commercial and postal services:—

"The undertakers (of said services) are obliged to adopt (on board their ships) . . . . wireless telegraph and telephone apparatus, whose system and power will be indicated, and, if necessary, modified by the Ministry of the Navy."

D *The OFFICIAL STATUTE BOOK of the Kingdom of Italy contains the following decree, numbered 1587 and dated at Rome November 12th, 1916.*

In pursuance of the law of May 22nd, 1915, No. 671, which confers extraordinary powers on His Majesty's Government and in pursuance of the law of June 30th, 1910, No. 395, and the relative regulations appertaining thereto, approved by Royal Decree of February 1st, 1912, No. 227, and in pursuance of the Royal Decree of July 11th, 1913, No. 1006, which gives effect to the International Radiotelegraphic Convention of London; and the Ministers in Council having given due consideration to the proposals placed before them by the Ministers of Maritime and Railway Transports and of Marine, in concert with the Minister of Posts and Telegraphs;

We have decreed and we hereby decree:

ART. 1.—All vessels of commerce, whether propelled mechanically or by sails, whether they transport passengers or not, if they have on board a total of fifty persons or more, must, whilst at sea, carry an equipment of radiotelegraphic apparatus.

ART 2.—From this obligation are exempted vessels on which the number of persons on board is exceptionally and accidentally increased to fifty or more, on account of *force majeure* or because the captain has been obliged to increase the number of his crew to make up for those who are ill, or on account of his having been obliged to transport persons picked up at sea or other persons.

There are also exempted from this obligation:

(1) Vessels which during their voyage do not travel at a distance of more than 150 nautical miles from the nearest coast.

(2) Vessels on which the number of persons present on board is exceptionally or eventually increased to fifty or more, after embarkation, during a part of the voyage, of extra hands which it is found necessary to bring in for the handling of goods; on condition, however, that the aforementioned vessels do not perform trans-oceanic voyages

MARCONI $\frac{1}{4}$ KILOWATT SET—WIRELESS TRANSMITTER (OPEN).
NOTE.—FREQUENCY 600 PER SECOND.

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and that, during the above-mentioned part of their voyage, they remain within thirty degrees latitude North and South.

(3) Sailing vessels of primitive construction, whose build renders it impossible for them to be equipped with radiotelegraphic apparatus.

ART. 3.—Vessels, which by virtue of Article 1 above-mentioned are required to be equipped with radiotelegraphic plant, are, as regards the Radiotelegraphic Service, divided into three classes, according to the classification of ship stations (prescribed by Article XIII.*b*) of the regulations annexed to the Radiotelegraphic Convention, signed in London on July 5th, 1912, viz. :—

First Class.—Vessels possessing continuous wireless service. In this first class are included vessels able to carry on board twenty-five passengers or more :

i. If they have an average speed of fifteen knots or more.

ii. If they have an average speed of over thirteen knots, but only on the double condition (*a*) that they have on board 200 persons or more (passengers and crew), and (*b*) that they perform, during their voyage, a journey of over 500 nautical miles between two consecutive ports of call. It is, however, allowable for these vessels to be included in the second class on condition that the listening-in service be continuous.

Second Class.—Vessels possessing a wireless service limited to certain hours.

In the second class are included vessels able to carry on board twenty-five passengers or more, if they are not, for other reasons, included in the first class.

Vessels of the second class must, whilst at sea, keep a permanent listening-in service of at least seven hours per day, and must, in addition, listen-in for ten minutes at the beginning of each of the remaining hours.

Third Class.—Vessels possessing a wireless service with no fixed hours of working.

In the third class are included all vessels which are not included in the first or second classes.

The owner of a vessel included in the second or third class has the right to demand that, in the certificate which is issued to him, the vessel in question be allocated to a superior class, if the said vessel satisfies all the requirements of that class.

ART. 4.—Vessels which, by the terms of Article 1 (above) must be equipped with radiotelegraphic plant shall be required to maintain whilst at sea a continuous listening-in service, if the Government shall judge that it is useful for the safety of life at sea.

In any case a continuous watch is required by :—

1. Vessels which possess an average speed of over thirteen knots; which have on board 200 persons or more; and which perform during their voyage journeys of over 500 nautical miles between two consecutive ports of call, even when those vessels are classified in the second class.

2. Vessels of the second class, during the whole time when they are voyaging over 500 nautical miles distant from the nearest coast.

3. Other vessels indicated in Article 1 when they are in the transatlantic service; or, whilst in other services, when their itinerary requires them to go over 1,000 nautical miles from the nearest coast.

Vessels used for all kinds of fishing purposes, including whalers which are required to be equipped with radiotelegraphic plant, are not obliged to maintain continuous listening service.

The continuous listening service can be performed by one or more telegraphists holding one of the certificates prescribed in Article X. of the regulations annexed to the International Radiotelegraphic Convention of 1912, and also, if necessary, by one or more qualified listeners. (*ascoltatori patentati*).

Nevertheless, should a reliable automatic alarm apparatus be invented, the continuous listening service may be maintained by means of that apparatus, after its use has been duly authorised by the Ministry of Maritime and Railway Transports.

By the term duly qualified listener (*ascoltatore brevettato*) shall be understood a person holding a certificate of competency issued by an administrative authority established for the purpose. To obtain such a certificate, the applicant shall be required to prove that he is competent to receive and to understand the radiotelegraphic distress signal and safety signal.

The registered owner shall take the necessary steps to provide that secrecy with regard to communications shall be respected by the qualified listeners in his empoly.

Art. 5.—The radiotelegraphic apparatus obligatorily fitted in accordance with Article 1 must be able to transmit, by day, from vessel to vessel, signals clearly perceptible under normal circumstances and conditions, at a minimum distance of 100 nautical miles.

Every vessei obliged, under the terms of Article 1 above-mentioned, to be equipped with radiotelgraphic apparatus, must (in whatever category it may be classed) be fitted in conformity with Article XI. of the regulations annexed to the International Radiotelegraphic Convention of 1912, with an auxiliary radiotelegraphic apparatus, every part of which shall be kept in a location as absolutely secure as possible.

In any case, the auxiliary apparatus must be entirely situated in the upper parts of the vessel, as high up as may be found practicable.

The auxiliary apparatus shall, as provided in Article XI. of the regulations annexed to the International Radiotelegraphic Convention of 1912, possess a source of power devoted to that purpose alone. The apparatus must be capable of being speedily adjusted and employed besides being able to be worked for at least six hours, with a minimum range of eighty nautical miles for vessels of the first class, and of fifty nautical miles for vessels of the other two classes.

If the normal apparatus, the range of which under the terms of this article covers at least 100 nautical miles, satisfies all the conditions indicated above, there is no obligation to carry also an auxiliary apparatus.

Art. 6.—Every installation must, after the owner has sent in his request, and before it starts working, be inspected and approved by the competent authorities; the Certificate of Inspection, which constitutes a working licence, in accordance with Article IX. of the regulations annexed to the Radiotelegraphic Convention of 1912, shall contain details of the apparatus as far as they relate to the terms of the concession; it shall be drawn up in duplicate, and one copy thereof shall be handed to the

commander of the vessel; but the copy shall not be thus issued if the apparatus does not comply with the conditions laid down in the Radiotelegraphic Convention of 1912 and in the present decree.

ART. 7.—Every captain of a vessel who receives a distress call from a vessel in danger is obliged to go to the help of those in danger.

The captain of every vessel in danger has the right to select from those vessels which have answered his call, that vessel or vessels which he considers to be the most capable of affording him help. He should only avail himself of such right, after having consulted as far as possible, the captains of the vessels themselves. The latter are obliged to comply immediately with such request, going with all speed to the help of those in danger.

The captains of the vessels upon whom devolves the duty of rendering assistance are released from their obligations as soon as the captain or captains requisitioned have made known that they are ready to obey the requisition; or as soon as the captain of one of the vessels which has reached the scene of the catastrophe shall have made known to them that their help is no longer necessary.

If the captain of a vessel finds it impossible, or does not consider it reasonable or necessary, under the special circumstances of the case, to go to the help of the vessel in danger, he immediately informs the captain of the latter. He must also enter in his log the full reasons prompting his decision.

ART. 8.—With regard to the terms of Article 1, ship-owners or their representatives shall, within fifteen days of the publication of the present decree make application to the Ministry of Posts and Telegraphs for any concession required for existing vessels (in accordance with Article 1) not already equipped with radiotelegraphy and not excused from the installation of such apparatus under the provisions of Article 2.

When it is desired to nationalise any vessels after the date of the present decree, and such vessels come within the scope of the conditions laid down in Article 1, neither the necessary nationalisation papers nor any provisional certificate will be issued unless the shipowner shows that he has made the proper application for a licence to instal radiotelegraphic apparatus on board.

Existing licences, notwithstanding the provisions of Article 7 of the regulations regarding radiotelegraphy at present in force, shall remain valid throughout the duration of the war. On their expiry the shipowner shall make application for a renewal in accordance with the article above-mentioned; moreover, it is further incumbent upon the shipowner to continue to work the ship station until the new licence has been obtained.

On the official licence there shall be entered a date on which each ship installation must be ready to work, this date will be estimated on the importance of the services for which vessel is destined, and in accordance with the opinion of the competent authorities.

For vessels which had a radiotelegraphic station, but which did not have the auxiliary apparatus required under the above-mentioned regulations, there is granted a period of one year from the date of the present decree to put the matter in order.

ART. 9.—Vessels whose owners shall not have made application for a radiotelegraphic licence within the period fixed by Article 8; or those

whose owners, having obtained their licence, have nevertheless neglected to put the station in working order, either in accord with the above-mentioned provision, or in accord with the term-limit inserted in the licence itself, may be refused the right of working cargoes.

Whenever vessels which have not complied with their obligation to instal radiotelegraphic apparatus are obliged to put to sea either because they have public services to fulfil, or for any reasons of national importance, the Minister of Transports shall have the power to issue official instruction that the station shall be installed and put in working order at the expense of the owner of the vessel.

The same power is granted to the Minister of Transports in cases where the vessels referred to in Article 1 navigate waters outside the limits set forth by Article 2.

The expenses incurred for such official installation of apparatus and for the putting in working order of the same shall be recoverable in the manner indicated in Article 205 of the laws governing the Mercantile Marine.

TEMPORARY PROVISIONS.

ART. 10.—It is therefore hereby rendered obligatory for the period of the war (and in any case, for not less than three years from the date of the licence) that all mechanically propelled mercantile vessels (of a gross tonnage of 2,000 or more in the case of cargo ships and of 1,500 tons or more in the case of passengers vessels) shall instal and maintain radiotelegraph stations in accordance with the existing laws and regulations, even although they are not compelled to apply for a radiotelegraph licence in accordance with Article 1.

ART. 11.—At the discretion of the Minister of Transports and following upon a request of the owners of the vessel, those vessels which perform voyages between ports of the Kingdom, excluding the Colonies, and which do not go beyond twenty miles from the coasts, may be relieved of the obligation set forth in the preceding article

ART. 12.—The regulations contained in Articles 3 and 9 are intended to apply also to those vessels alluded to in these temporary provisions, except as regards the duration of the concession and the obligation to apply for its renewal. However, in the case of these vessels a special auxiliary plant is not indispensable and it will be sufficient if the range of the station do not fall below eighty nautical miles, and that it is possible for regular transmission to be carried out at any moment.

ART. 13.—The Commission for Insurance against war risks at sea, sitting at the "National Insurance Institute," in determining the premiums in respect of vessels, shall take into account the existence on board of radiotelegraph apparatus, whether temporary or permanent in accordance with these temporary provisions.

ART. 14.—In order to ensure the working of the radiotelegraphic service on mercantile vessels, operators not indispensable for the Royal Army and for the Royal Navy, will be exempted from military service at the request of the Ministry of Maritime and Railway Transports.

ART. 15.—The present decree takes effect from the day of its publication in the "Official Gazette" of the Kingdom of Italy.

We order that the present decree, stamped with the seal of State, be inserted in the official collection of laws and decrees of the Kingdom of Italy, ordering that everyone whom it concerns may observe it or cause it to be observed.

Dated Rome, November 12th, 1916.

JAMAICA

A—Telegraph Control Law, 1904.

B—Direct West India Cable Company's Law, 1909.

C—Regulations under Law of 1904.

D—Further Rules and Regulations.

The Telegraph Control Law (7) of 1904.

A NO person shall, within the Colony or any of its Dependencies, establish, maintain or use any telegraphic apparatus, mechanism, or contrivance, of what nature or kind soever the same may be, without due permission or licence under the hand of the Governor previously obtained for that purpose.

It is hereby expressly declared that what is commonly known as "wireless telegraphy," including the Marconi apparatus and any similar or other mechanism or contrivance whatsoever for the transmission of telegraphic messages without the employment of wires or cables, is a telegraphic apparatus, mechanism, or contrivance within the meaning of this Section.

2. It shall be lawful for the Governor in Privy Council from time to time to make and as he shall see fit repeal, alter or vary rules and regulations for all or any of the following purposes, viz :—

Permitting or licensing any person to establish, maintain, or use any telegraphic apparatus, mechanism, or contrivance, whether for the service of the public or for any private purpose;

Attaching conditions, restrictions, and limitations to the exercise of the privilege by such permission or licence conferred:

Providing suitable penalties and forfeitures for the contravention of the prohibition above contained in Section 1 of this law, and to the breach of any rule or regulation made thereunder, and providing for the recovery thereof, summarily or otherwise; provided that the penalty (over and above forfeitures) to be imposed for any one offence shall in no case exceed a fine of Two Hundred Pounds, or in default of payment thereof imprisonment, with or without hard labour, for a period not exceeding twelve months;

The exercise of all such powers and control over telegraphic establishments (by temporarily entering into possession thereof or otherwise) as may be necessary for the public safety, whether at all times, or in any case of emergency which may arise;

And generally for the better carrying out of the purposes of this law.

Such rules and regulations shall come into force as from the date of publication thereof in the *Jamaica Gazette*.

3. Nothing in this law contained shall invalidate or impair any legal right already possessed by any telegraph or cable company, relative to the laying down or landing of any telegraphic cable, the removal, renewal, maintenance, and use thereof, or any other like matter.

4. Law 1 of 1903 is hereby repealed.

Law 21 of 1909.

The Direct West India Cable Company's Law, 1909.

B Whereas the Direct West India Cable Company, Limited, is desirous of establishing a wireless installation for communication between ships and the shore in Jamaica;

And whereas under the provisions of Law 7 of 1904, entitled "The Telegraph Control Law, 1904," no person shall establish, maintain, or use within the Island of Jamaica, or any of its Dependencies, any apparatus or machine whereby communication by Wireless Telegraphy can be held between the said Island and ships, without having first obtained the sanction of and a Licence from the Governor;

And whereas a Licence to erect such a wireless station has been granted to the Direct West India Cable Company, Limited, by the Governor of Jamaica;

Be it enacted by the Governor and Legislative Council in Jamaica as follows :—

1. The protection, rights, powers, and facilities already granted to The Direct West India Cable Company, Limited, under Law 16 of 1898, entitled "The Direct West India Cable Company's Law, 1898," are granted and extended for the purposes of wireless telegraphy installation to be installed by the company or worked and maintained by them in so far as they may be applicable to the satisfactory and efficient working and maintenance of a wireless station or stations.

2. The Government of Jamaica shall acquire for the use and at the expense of the company a piece of land of sufficient dimensions at a place to be selected by the company and approved by the Government suitable and convenient for the economical erection, maintenance, and working of the installation, and when acquired such piece of land shall be conveyed to the company in fee simple, or if the Government of Jamaica possesses a piece of land of sufficient dimensions at a place approved by the company suitable and convenient for the economical erection, maintenance, and working of the installation and which the Government considers it desirable the company should have, the Government may sell the said piece of land at a price to be mutually agreed upon, or the Government may rent it to the company on such terms as may be agreed on during the period of the licence or for so long as the company may continue to work a wireless station or stations.

The acquisition of land by the Government of Jamaica under this section shall be deemed as an acquisition for public work within the meaning of the Public Lands Acquisition Law, 1897 (Law 31 of 1897).

REGULATIONS.

It will be noted that under Clause 2 of the Telegraph Control Law (7), 1904, the Governor in Privy Council has the power of making rules and regulations, and a set of rules were accordingly promulgated during the year 1909, under which the working of Wireless Telegraphy is now being administered in Jamaica. These rules read as follows :—

C 1. Any licence granted under Law 7 of 1904 shall only entitle the licensee to establish, maintain and use that particular class of telegraphic apparatus, mechanism of contrivance mentioned in the licence. Every licence granted under the said law shall make mention of and fully describe the particular class of telegraphic

apparatus, mechanism or contrivance which the applicant proposes to establish, maintain and use.

2. Every person establishing, maintaining or using any telegraphic apparatus, mechanism or contrivance in contravention of Section 1 of the Telegraph Control Law, 1904 (Law 7 of 1904) shall be liable to penalty not exceeding two hundred pounds, or in default of payment, to be imprisoned with or without hard labour for a period not exceeding twelve months, and the telegrapic apparatus, mechanism or contrivance so established, maintained or used shall be liable to be forfeited to the Government of Jamaica.

3. Every person licensed under this law, who uses any telegraphic apparatus, mechanism or contrivance for which he has not a licence, shall be liable to the penalty and forfeiture mentioned in Rule 2 hereof, if the Resident Magistrate thinks fit to order such forfeiture.

4. Every person licensed under this law who acts contrary to the terms of this licence shall be liable to the penalty and forfeiture mentioned in Rule 2 hereof, if the Resident Magistrate thinks fit to order such forfeiture.

5. Proceedings for penalty and forfeiture under these rules shall not be taken except upon the authority of the Attorney General.

6. Proceedings for the recovery of any penalty and for any forfeiture under these rules shall be of a summary nature and shall be taken before the Resident Magistrate for Kingston.

D *Further Rules and Regulations made by the Acting Governor in Privy Council under the Telegraph Control Law,* 1904, *Law* 7 *of* 1904.

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of this colony shall be worked in such a way as not to interfere with (*a*) naval signalling, or (*b*) the working of any wireless telegraph station lawfully established, installed or worked in the colony or the territorial waters thereof and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the colony except with the special or general permission in writing of the Governor.

3. These rules and regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

4. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy the use of the wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules and regulations as may be made by the Governor from time to time, and such rules and regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. The master of any merchant ship on board of which apparatus for wireless telegraphy shall be worked or used contrary to these rules and regulations shall on summary conviction before a Resident Magistrate be liable to a penalty not exceeding two hundred pounds, and in

default of payment to be imprisoned with or without hard labour for a period not exceeding twelve months.

JAPAN

A—Regulations under Telegraph Act of 1900.
B—Regulations of 1st July, 1913.

A IN accordance with the Telegraph Act of Japan, 1900, "The Telegraph and Telephone Service shall be under the supervision of the Government," but private telegraphs or telephones may be established subject to certain regulations. The following regulations have been made regarding wireless telegrams :—

1. The expression "wireless telegram" means any telegram to be transmitted by wireless telegraphy.

2. In the present Regulations the term "coast station" means any telegraph office on land equipped with wireless telegraph apparatus, and the term "ship station" means any telegraph office on board a ship equipped with wireless telegraph apparatus.

3. Wireless telegrams shall bear the following abbreviated instruction :—

"R A" in the case of Romanised telegrams.

4. The name of a coast station through which a wireless telegram destined for a ship station is to be transmitted shall be indicated within parentheses in the address of the telegram, but such indication shall not be counted in the number of words even in the case of a Romanised telegram.

In case such coast station cannot transmit the telegram, but there is another coast station which is able to do so, the intermediary of the latter may be resorted to. If a telegram destined for a ship can be delivered direct to the addressee from a telegraph office on land, it may be delivered from such office without the use of wireless telegraphy.

(*a*) Wireless telegrams to be transmitted by way of intermediate ship station, with the exception of those handed in at a ship station, shall bear the following abbreviated instruction :—

"R S" in the case of Romanised telegrams.

Such intermediary transmission can in no circumstances be made more than once.

5. If the sender of a wireless telegram destined for a ship station wishes to indicate the term during which his telegram is to be kept at the coast station, the number of days shall be inserted in the telegram as paid instruction.

Wireless telegrams without such instruction will be retained at the coast station for nine days from the day of handing in. However, in case the transmission of a telegram cannot be effected on account of the ship station's leaving out of the radius of action of the coast station or for any other reasons, the telegram may not be retained, if the retention is deemed unnecessary.

6. If the sender wishes to prolong the term of retention mentioned in Article 5, application to that effect shall be made to the coast station before the expiration of the term. The same applies to further prolongation of the term. In such case, the term of retention will be nine days, unless specially indicated.

The application shall contain the date of handing in, number of characters or words and the names of the sender and addressee of the wireless telegram.

The sender may make the application mentioned in Paragraph 1 through the office of origin. If he wishes it notified to the coast station by telegraph, he shall pay the charge for a paid service telegram for the purpose.

7. The transmission of a wireless telegram is to be effected when both the sending and receiving offices are within the guaranteed range of action of each other.

8. In the case of ships' distress, wireless telegrams informing the name of the ship in distress, the location and condition of the doomed vessel and any other particulars necessary for rescue, shall be treated by coast or ship stations with absolute priority suspending all other communications.

9. Paid service telegrams concerning enquiry, rectification and stoppage of a wireless telegram to which reply is required can be exchanged only between telegraph offices on land.

10. "Urgent telegrams," "redirected telegrams," and "telegrams with acknowledgment of receipt" are admissible between telegraph offices on land.

The sender of a wireless telegram with acknowledgment of receipt will be notified of the date and time at which the coast station has transmitted the telegram to the ship station.

(*a*) Telegrams of the same text originating from the same ship station or from the same telegraph office on land, and passing through the same coast station, may be made a multiple telegram, so far as concerns the transmission between wireless telegraph stations or between telegraph offices on land, as the case may be, no matter whether the addresses of such telegrams be in different localities or they be served by different offices of destination. The telegram shall bear the following abbreviated instruction instead of that for an ordinary multiple telegram :—

"S M" in the case of Romanised telegrams.

Paragraph 2 of Article 4 is not applicable to the multiple telegram mentioned in the preceding paragraph when it is to be distributed to two or more ship stations, unless every copy of such telegram can be transmitted through the same coast station or delivered from the same telegraph office on land.

(*b*) Reply-paid wireless telegrams shall bear the abbreviated instruction for "reply paid," "urgent reply paid," or "collated reply paid," completed by the mention of the prepaid amount. If a prepaid amount is 60 sen in the case of *kana* telegrams, and 75 sen in the case of Romanised telegrams, the mention of the amount is not required.

11. Wireless telegrams are subject to the following charge for the operation at a coast station or a ship station in addition to the ordinary telegraph charge. It is provided, however, that the ordinary telegraph charge is not levied on a telegram which is to be transmitted only by wireless telegraphy.

For Government and Ordinary Telegrams.

Coast charge: For a *kana* telegram, 20 sen up to fifteen characters, 5 sen for every additional five characters or less.
For a Romanised telegram, 25 sen up to five words, 5 sen for every additional word.

Ship charge: Ditto.

For Press Telegrams.

Coast charge: 20 sen for every fifty characters or fraction thereof.

Ship charge: Ditto.

(*a*) The following charge is levied in the same way as mentioned in the preceding Article on a supplementary copy of a multiple wireless telegram.

For Government and Ordinary Telegrams.

Coast charge: For a *kana* telegram, 10 sen;
For a Romanised telegram, 15 sen.

Ship charge: Ditto.

For Press Telegrams.

Coast charge: One-half the charge for the original telegram.

Ship charge: Ditto.

(*b*) If, in the case where Paragraph 2 of Article 4 is applied, the amount paid fall insufficient, the deficiency is collected from the addressee. In the case of a multiple telegram the amount to be collected is divided by the number of copies, and the quotient shall be the sum to be collected from one addressee.

12. Wireless telegrams are free from special charge applicable to telegrams handled out of the ordinary hours of duty.

13. The following charges for a wireless telegram shall be refunded less the amount which has been appropriated for another charge:—

(1) The charges pertaining to the transmission by wireless telegraphy when not effected.

(2) The charges pertaining to the transmission on telegraph lines when not effected.

14. An application for the refund of charges for a wireless telegram handed in at a ship station may be sent in through any telegraph office.

15. The term of retention mentioned in Articles 5 and 6 is not reckoned in the period of delay giving rise to refunds.

16. All matters not provided for in the present Regulations are governed by other rules applicable to "inland telegrams," with the exception of Articles 71, 114, 121, 126 to 130, 146 to 148 of the Regulations regarding Inland Telegrams.

(*a*) The provisions of the present regulations, except Articles 9, 10 and Proviso of 16, are applicable to telegrams exchanged between offices on land by means of wireless telegraphy. The Minister of Communications may fix a special charge for such telegrams, if he deems necessary.

With regard to the special treatment of wireless telegrams, as well as the special charge mentioned in the preceding paragraph, it will be notified in other ways.

B The following supplementary regulations came into operation on July 1st, 1913, and apply to all Japanese possessions :—

1. Foreign wireless telegrams are understood to be those which are treated according to the regulations of the London International Radiotelegraphic Convention or to the regulations concerning the radiotelegraphic service concluded between the Government of the Empire and foreign Governments or companies.

2. The rates to be charged for foreign messages through Japanese coast and ship stations are as follows :—

    1. Coast station rate, 24 yen (fr. 0.60) per word.
    2. Ship station rate, 16 yen (fr. 0.40) per word.

    The coast station rate referred to in the preceding paragraph includes the rate applicable to the transmission on telegraph lines for wireless messages originating in or destined for the Japanese Empire or Southern Manchuria or for ships' stations transmitted through Japanese coast stations and the Japanese telegraph service. As regards urgent wireless messages for transmission over land lines, an extra 10 yen (fr. 0.25) will be charged.

3. The rates to be charged for foreign radiotelegrams through foreign coast or ship stations will be indicated separately.

4. The ordinary rate for foreign wireless messages accepted by a Japanese ship station for transmission through a foreign coast station will be fixed by the owners of the said foreign coast station.

5. For the acknowledgment of receipt of foreign wireless messages handed in at a Japanese telegraph office and destined for a ship station and transmitted thereto through a Japanese wireless coast station, the rate for the acknowledgment of receipt of interior telegrams for transmission between Japan and Southern Manchuria will be charged.

6. At the request of the receiver, or of the person empowered to receive messages for and on behalf of the receiver, wireless messages may be retransmitted only over Japanese land lines.

7. When the Japanese coast station given by the sender of a foreign wireless message destined for a ship cannot transmit the said message it may be transmitted through another Japanese coast station, provided such station is suitable for the purpose. This provision also applies in case the Japanese ship station cannot transmit a foreign wireless message to a Japanese coast station mentioned by the sender and where another Japanese coast station exists and which is capable of performing the duty.

8. Japanese ship stations cancel foreign wireless messages when they are not in a position to transmit the same to the corresponding stations.

9. Should a foreign wireless message be cancelled in accordance with Article 8, the sender shall be at once advised and the money paid by him returned without delay.

10. For everything which is not mentioned in these regulations the regulations relating to foreign telegrams are applicable.

MAURITIUS

THE legislation affecting Wireless Telegraphy in the Mauritius was originated by an Ordinance (No. 33) issued in 1903 investing the Governor with certain administrative powers. This was amended by the "Wireless Telegraphy" (Amendment) Ordinance (No. 25) of 1912. These have since been consolidated by Ordinance No. 11, dated 22nd August 1913, the text of which reads as follows :—

BE IT ENACTED by the Governor, with the advice and consent of the Council of Government, as follows :—

1. *Definition of "Wireless Telegraphy."*—In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received : Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

2. *Licence for "Wireless Telegraphy."*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

3. *Apparatus aboard ships.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

4. *Regulations.*—(1) The Governor in Executive Council may from time to time make regulations for carrying into effect the purposes of this Ordinance.

(2) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

5. *Search Warrant.*—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by the Inspector General of Police and named

in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. *Penalties.*—Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable to a fine not exceeding five hundred rupees (Rs. 500) and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

7. *Repeal clause.*—Ordinances Nos. 33 of 1903 and 25 of 1912 are repealed.

8. *Short Title.*—This Ordinance may be cited as "The Wireless Telegraphy (Amendment) Ordinance, 1913."

Passed in Council at Port Louis, Island of Mauritius, this twenty-ninth day of July, One thousand nine hundred and thirteen.

NETHERLANDS.

A—Telegraph and Telephone Act, 1904.
B—Royal Decree 6th March, 1905.
C—Royal Decree of the 10th May, 1906.
D—Regulation for Colony of Curaçao.
E—Regulation for Dutch East Indies.

In 1914 an appeal was presented to Parliament by the Minister of Waterways for addition to and modification of some articles of the Telegraph and Telephone Act of 1904. The purpose was that of placing it beyond the possibility of doubt that this Act should relate also to wireless installations intended for private telegraphic and telephonic intercourse. Furthermore, this (proposed) Bill gives effect to Article IX., Paragraph 2, of the International Radiotelegraphic Service Regulations, which has reference to Licences for Ship Stations subject to Foreign Governments. In 1916 a further Bill was presented to Parliament by the Minister of Agricultural Industries and Commerce to give effect to the "International Convention for the Safety of Life at Sea." *Neither of these two Bills has as yet been passed.*

At the outbreak of the present European War the use of all amateur stations, including those which are only suitable for reception, was prohibited.

TELEGRAPH AND TELEPHONE ACT OF 1904.

A The Telegraph and Telephone Act of 1904 mainly refers to the ordinary wired services, and it has not been judged worth while, therefore, to reprint it in full here.

According to Article I. a licence must be applied for by privately owned radiotelegraphic stations intended for public traffic.

According to Article II. of this Act, a licence granted by the Queen is necessary before telegraphs and telephones can be established, or worked by private enterprise. The Act also contains the terms under which the licence is issued and the conditions binding on the licensee.

Both of the above provisions of the 1904 Act are applicable to wireless telegraphy.

B ARTICLE I. of the Royal Decree of March 6th, 1905, supplemented and amended under the Decree of July 11th, 1914, bears reference to wireless telegraphy :—

ARTICLE I.

Unless provided with a permit from the Minister of Waterways, Commerce and Industries, and subject to observance of the conditions and stipulations therein contained for the purpose of preventing interference with the exploitation of telegraphs and telephones intended for public traffic, it is forbidden to lay down or to use the following :—

1. (*a*) Any electric conductors above ground for lighting purposes or for the transmission of power at a distance of less than 6 metres measured in horizontal projection from any overground conductor belonging to the telegraphs and telephones intended for public traffic.

(*b*) Any other electric conductor above the ground at a distance of less than 2 metres measured in horizontal projection from any conductor above ground belonging to the telegraphs and telephones intended for public traffic.

2. Any underground electric conductors at a distance of less than 0·50 metre from any underground conductor belonging to telegraphs and telephones intended for public traffic.

3. Any electric installation intended for non-public telegraphic and telephonic intercourse by means of apparatus which are not connected with one another at the terminal points by wires or conductors.

Among the conductors referred to under 1 and 2, electric conductors within buildings are not included.

Among the installations referred to under 3 shall not be included plants the apparatus of which are only suitable for the reception of radiotelegraphic signals, unless the plants are provided with an antenna placed within 1,500 metres of a Government station for radiotelegraphy, and more than 30 metres high above the ground.

The permit referred to under 1, 2, and 3 above, is not required for electric conductors and installations which are already in use when this general working regulation comes into force.

C Decree of May 10th, 1906, relating to the fixing of provisional tariff for telegraphic communications for reports and distress signals received by radiotelegraphic means from ships at sea.

ARTICLE 1.

The Government Office with radiotelegraphic service at Scheveningen Harbour shall report by telegraph, to those who have notified themselves for the purpose, the communications from ships and distress signals received by way of radiotelegraphy.

ARTICLE 2.

The reports referred to in Article 1 shall be supplied within the Netherlands subject to the payment by the addressee of a coast charge of 1 florin for the present for each communication, increased by an amount of 50 cents if the telegram to be drawn up does not contain more than 10 words, and of 25 cents above this for each successive 10 words or fraction thereof.

Nevertheless, the reports herein mentioned may also be supplied against such a fixed price per year as shall be fixed by our Minister of Waterways, Commerce and Industry for each interested party, taking into consideration both the number and the extent of the required information and also the above-named tariff.

In supplying the reports referred to in this Article to interested parties outside the Netherlands, the above-mentioned costs will be increased by the foreign telegraphic tariff applying thereto.

ARTICLE 3.

This Decree shall come into operation on the second day after the date of the *Staatsblad* and the *Staatscourant* in which it is published.

Our Minister of Waterways, Commerce and Industry is entrusted with the execution of this Decree, which shall be published simultaneously in the *Staatsblad* and in the *Staatscourant*, and a copy whereof shall be sent to the State Council.

REGULATIONS FOR TELEGRAPH SERVICE IN THE DUTCH COLONY OF CURACAO.

Publication No. 52 of 1909. (21st September.)

D The Governor of Curaçao, in view of the desirablity of replacing by new regulations the decree of the 30th October, 1873, regulating the inland and foreign telegraph communication of the colony as well as that of the 27th September, 1884, regulating telephonic communication, and having received the sanction of the Colonial Council, has determined on the following decree :—

ART. 1.—In this decree it is understood that telegraphs and telephones refer to the usual line-telegraphs and telephones as well as to radio-telegraphs and telephones.

ART. 2.—No telegraphs and telephones may be installed on any of the islands of the colony by others than the Government, unless a special permit is granted. Besides the special conditions, made in each case, the general rules are :—

(*a*) The erection, maintenance and exploitation should be carried out to the satisfaction of the Governor.

(*b*) The tariffs, conditions of use and service regulations must be submitted for the approval of the Governor.

(*c*) The concession may be granted absolutely or conditionally, but for no longer period than 25 years.

(*d*) The concession may be withdrawn by the Governor if the above rules or the special conditions are not followed.

ART. 3.—It is forbidden, without the permission of the Governor, to use radio-telegraphs or telephones, fitted on board foreign or private-owned Dutch ships, in the ports or anchorages of the colony, unless in special circumstances, the exigencies of good seamanship render it necessary to do so.

ART. 4.—Everybody may make use of telegraphs and telephones under the existing regulations. The transmission of telegrams or the conversation by telephone may be stopped or refused if in conflict with the safety of the colony, public order, or common decency.

The reasons for refusal or stoppage should be communicated to the party concerned.

The decision of the Governor may be invoked in such cases.

ART. 5.—For the public interest the Governor may put telegraph and telephone service under control or partially suspend it for an indefinite period.

ART. 6.—In case of war, or if any of the islands of the colony be placed under martial law, if so desired the telegraphs and telephones may be put under Government control.

ART. 7.—Imprisonment of one day to six months and fines from 10 florins to 1,000 florins conjointly or separately will be inflicted on those who erect or exploit telegraphs and telephones, without the permission required as specified in Art. 2; or who on board private-owned ships, make unlawful use of the same (Art. 3).

The instruments may, in so far as they are owned by the guilty parties, be confiscated.

ART. 8.—Anyone who wilfully damages or destroys telegraph and telephone works, including cables, in use for public benefit, will be punished with imprisonment from three months to three years.

Anyone who causes such damage as is referred to above, through neglect, may be punished with imprisonment of one day to one month or a fine of 1 florin to 100 florins.

ART. 9.—Deals with the punishment of crimes committed in which telephones are used.

ART. 10.—Libellous, offensive and indecent expressions used over the telephone, will be considered as uttered in public.

ART. 11.—Violation of the secrecy of telegraphs and telephones is punishable in accordance with Arts. 137 and 327 of the existing law.

ART. 12.—Owners of property have to allow, if it is necessary, work to be done on it in connection with the erection of public telegraphs.

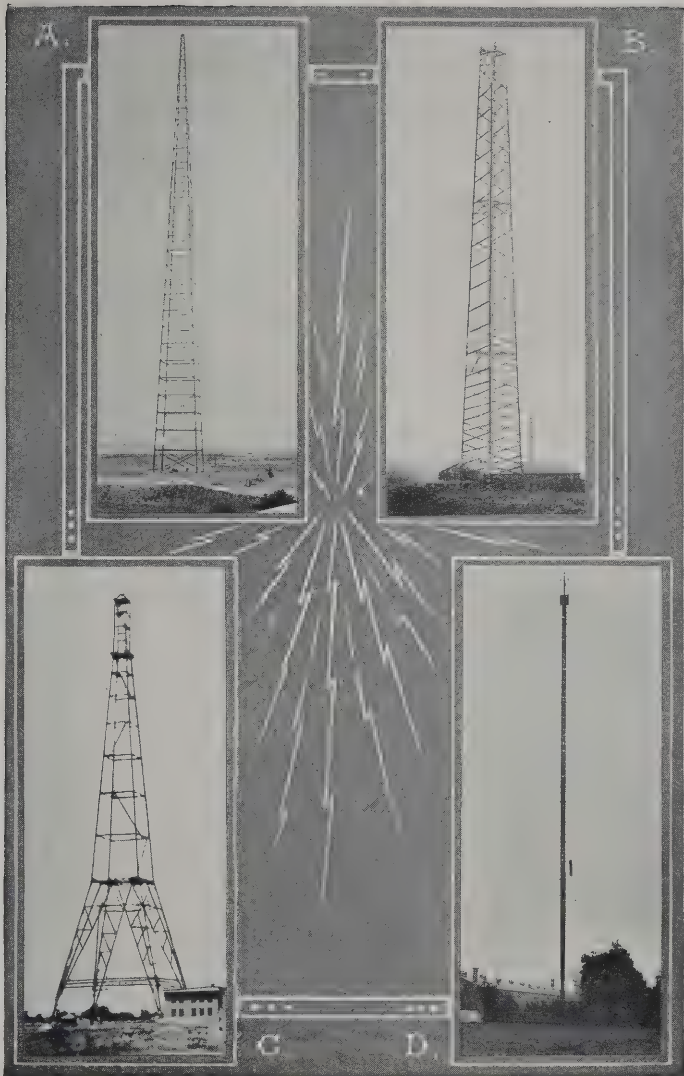
ARTS. 13, 14, 15 and 16 deal with the use of private property in the erection of telegraph and telephone lines.

ART. 17.—All precautions should be taken to prevent lightning being conducted along cables or lines.

ART. 18.—The above may be referred to as "Telegraaf- en Telefoon-Verordening 1909," adding the number of the publication.

ART. 19.—Decrees of 30th October, 1873 (P.B. 1874, No. 1.) and of 27th September, 1884 (P.B. 1884, No. 14) as well as P.B. 1892, No. 27 are withdrawn.

ART. 20.—Concessions relating to the erection of telegraphs and telephones on any of the islands of the Colony of Curaçao, granted before this decree comes into force, will be treated as coming under the regulations in force when they were made.



Types of Masts used in Wireless Telegraphy.

A. STEEL LATTICE MAST AT CADIZ.

B. WOOD LATTICE MAST OF ORIGINAL CAPE COD STATION.

C. SELF-SUPPORTING STEEL TOWER AT WASHINGTON (ARLINGTON STATION).

D. TUBULAR STEEL MAST AT CHELMSFORD, ENGLAND.

[*To face page* 272.

Regulations for Telegraph Service in the Dutch East Indies.

6th October, 1876.

E The old regulations issued by decree of 31st March, 1858, concerning the electro-magnetic telegraphs should now be superseded and new regulations as hereunder be brought into force.

Regulations concerning the erection and use of telegraphs in the Dutch East Indies.

Art. 1.—No telegraphs may be erected or used without permission of the Government, except those exclusively owned and used privately.

Art. 2.—The conditions for permission to erect such telegraphs will be fixed in each case separately.

Art. 3.—The Governer-General has the right to take possession of all telegraphs or to stop their exploitation.

Art. 4.—If telegraphs are erected without permission open for public traffic, a fine of from 200 florins to 1,000 florins can be inflicted.

Art. 5.—Owners of property have to allow, if it is necesary, work to be done on it in connection with the erection of public telegraphs.

Art. 6.—They should give access to officials and not interfere with the work done and the lines erected.

Art. 7.—If they refuse access they will be fined from 25 florins to 100 florins.

Art. 8.—They have a right to compensation for damage done to their property.

Art. 9.—Everybody has a right to have telegrams sent under the conditions laid down in the service regulations.

Art. 10.—The State or the Telegraph Company is not responsible for the transmission of telegrams in general or within a certain time.

Art. 11.—Punishment for embezzlement or opening of telegrams, communication of their contents to outsiders, etc., will be inflicted in accordance with the existing laws.

Art. 11*a*.—Telegrams, the contents of which are of danger to the State, or in conflict with the law, or of an obscene character, will not be accepted or delivered.

Art. 12.—Punishment in accordance with the eixsting laws is to be inflicted on every official who falsifies telegrams and on those who knowingly profit by the misuse of such telegrams.

Art. 13.—Damage to telegraph works or material is punishable with imprisonment and penal servitude.

Art. 14.—The Head of the Local Council may order, on request of the Chief of the Telegraph Service, the removal of everything impeding the efficiency of that service.

The above was published in the *Official Gazette* (*Staatsblad*) of the Dutch East Indies, and the regulations also apply to Telegraphs or Telephones, whereby the apparatus at both ends is not connected with wires or conductors (decree of 7th December, 1903. *Staatsblad* No. 405).

NEWFOUNDLAND

A—Post and Telegraph Act, 1906.

B—Act of 1905 (Cap. VII.).

C—Wireless Telegraphy (Steamers) Act, 1914.

D—Wireless Licence.

A WIRELESS telegraphy in Newfoundland is governed by the Post and Telegraph Acts, 1891 to 1906. The 1906 Act reads as follows:—

1.—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy, in any place in this Colony, or on board any ship registered in this Colony, except under and in accordance with a licence granted in that behalf by the Postmaster-General, with the consent of the Governor in Council.

(2) Every such licence shall be in such form and for such period as the Postmaster-General may determine, and shall contain the terms, conditions, and restrictions on and subject to which the licence is granted, and any such licence may include two or more stations, places or ships.

(3) If any person establishes a wireless telegraph station without a licence in that behalf, or instals or works any apparatus for wireless telegraphy without a licence in that behalf, he shall be guilty of a misdemeanour, and be liable on conviction in a summary manner before a Stipendiary Magistrate to a penalty not exceeding fifty dollars, and on conviction on indictment to a fine not exceeding five hundred dollars, or to imprisonment, with or without hard labour, for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Act except by order of the Postmaster-General.

(4) If a Stipendiary Magistrate is satisfied by information on oath that there is reasonable ground for supposing that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship as aforesaid without a licence in that behalf, he may grant a search warrant to any police officer or any officer appointed in that behalf by the Postmaster-General, and named in the warrant, and a warrant so granted shall authorise the officer named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used, or intended to be used, for wireless telegraphy therein.

(5) When a fine under this Act is imposed by a Court, Judge or Magistrate, and the master or owner of any ship is ordered to pay the same and the same is not paid at the time and in the manner prescribed, the Court, Judge, or Magistrate making the order may, in addition to any other powers they may have for the purpose of compelling payment, direct the amount remaining unpaid to be levied by distress and sale of the ship, her tackle, furniture and apparel.

(6) The Postmaster-General may make regulations for prescribing the form and manner in which applications for licences under this Act

are to be made, and with the consent of the Governor in Council, the fees payable on the grant of any such licence.

(7) The expression "wireless telegraphy" means any system of communication by telegraph as defined in "The Post and Telegraph Acts, 1891 to 1904," without the aid of any wire connecting the points from and at which the messages or other communications are sent and received.

2. This Act shall be read with and form part of "The Post and Telegraph Acts, 1891 to 1904," and the said Acts and this Act may be cited as "The Post and Telegraph Acts, 1891 to 1906."

B The Act of 1905, Cap. VII., refers to taxes upon business transacted by telegraph and telephone companies within and in transit through the Colony. Clause 2, Section 2, reads as follows:—

A sum equal to one per cent. in manner hereinafter provided of the total amount received by or due to the company in respect of all telegraphic messages passing over the land lines of the company or transmitted or received by any wireless method of telegraphy to or from any place within this Colony from or to any other place within this Colony during a period of twelve calendar months ending on the first day of May of each year: Provided that this sub-section shall not apply to messages which originate or are delivered in any place outside the Colony.

The first of such payments shall be made on the 30th day of June, 1906, in respect of the period of twelve months ending on the preceding first day of May.

Section 4 of the same Clause (2) reads as follows:—

A sum of four thousand dollars ($4,000) in respect of every wireless telegraph station or other means of communication by wireless methods of telegraphy between this Colony and any place, ship or vessel outside this Colony, for the time being belonging to or worked by or on behalf of the company which now is or hereafter shall be established in this Colony.

The first of such payments shall be made on the 30th day of June, 1906: Provided that if the Governor in Council is satisfied that any such wireless telegraph station or other such means of communication is established for the purpose only of reporting passing ships or vessels, he may dispense the payment of such last-named sum and discharge the company from liability therefor in respect of such station or means of communication.

Clause 1 (1) of the Act of June 15th, 1905, Cap. XXI., reads:—

Whenever in the opinion of the Governor an emergency shall have arisen in which it is expedient for the public service that the Government of the Colony shall have control over the transmission of messages over any telegraph line, telephone line, or by any other form of telegraphy, it shall be lawful for the Governor in Council at any time to assume and for any length of time retain possession of any telegraph line, telephone, or any form of telegraphy in this Colony, and of all things necessary for the efficient working thereof, and may for the same time require the exclusive service of the operators and other persons employed in working such telegraph line, telephone, or any form of telegraphy; and the company or other proprietor of such telegraph line, telephone, or any form of telegraphy, shall give up possession thereof.

and the operators and other persons so employed shall, during the time of such possession, diligently and faithfully obey such orders and transmit and receive such despatches as they are required to receive and transmit by any officer duly authorised by the Governor in Council, and every company or other proprietor, operator or person violating any of the provisions of this section shall incur a penalty not exceeding one hundred dollars ($100) for every refusal or neglect to comply with the requirements thereof, such penalty to be recovered by action in the name of the Minister of Finance and Customs, in a summary manner before a Stipendiary Magistrate or Justice of the Peace.

C THE following Act respecting the provision of wireless telegraphy on steamers engaged in the trade of Newfoundland was passed on September 4th, 1914 :—

"WIRELESS TELEGRAPHY (STEAMERS) ACT."

1. Every steamer to which this Act applies shall be provided:

(1) With a wireless telegraph installation approved of by the Minister of Marine and Fisheries;

(2) With at least one qualified wireless operator approved of by the Postmaster-General;

(3) With a Morse signalling apparatus approved by the Minister of Marine and Fisheries;

(4) With at least one person on board capable of operating such signalling apparatus and of reading signals from other ships.

2. The wireless telegraphy installation provided on a ship to which this Act applies shall be maintained in good order and shall be attended to by an operator qualified as aforesaid in accordance with rules and regulations to be made by the Governor in Council under this Act for the purposes thereof.

3. No steamer to which this Act applies shall receive a clearance at any Custom House for the Seal fishery or otherwise unless and until the Collector is satisfied that the provisions of this Act in respect of said steamer have been complied with.

4. If any requirement of this Act is not complied with in the case of any steamer to which this Act applies, the master or owner shall be liable for each offence to a fine of twenty-five hundred dollars, to be recovered in a summary manner before a Stipendiary Magistrate.

5. This Act shall apply to any steamer which ordinarily is engaged in prosecuting the Seal fishery from any port of this Colony, when engaged in the Seal fishery or when carrying more than sixty persons; and to any other vessel carrying passengers from or within this Colony when named by the Governor in Council in a Proclamation to be published in the *Royal Gazette*.

6. Nothing in this Act shall affect the obligation to obtain a licence for a wireless telegraphy installation under "The Postal and Telegraph Acts, 1891 to 1906," or prevent the Governor in Council or other person exercising a like control over such wireless telegraphy in times of war or otherwise as may be exercised in respect of other wireless telegraphy.

D The various Acts printed above affect the Regulations of Wireless Telegraphy in the Colony of Newfoundland, supplemented in actual working by regulations which appear in the form "W. 19 Ship Licence," which is "issued in accordance with the

provisions of the London Convention 1912." This licence consists of twenty clauses and a schedule. Of these, Clauses 1 to 6 consist of the ordinary definitions of terms and provisions for good order in working.

Clause 7 reads as follows :—

7. (i) If and whenever any department of the Government shall require the licensee, his servants or agents to transmit, by means of the licensed apparatus, any message on His Majesty's service (including messages to and from ships of His Majesty's Royal Navy or Newfoundland or Canadian Government vessels), such messages shall have priority over all other messages, and the licensee, his servants and agents shall, as soon as reasonably may be, transmit the same, and shall, until transmission thereof, suspend transmission of all other messages, and the rates to be charged on such messages shall not exceed half the rates charged the ordinary public.

(ii) The licensee shall not be entitled to claim any compensation in respect of the suspension of the transmission of messages as aforesaid.

Clauses 8 and 9 provide respectively for transmission of Distress Signals and Secrecy, whilst Clauses 10, 11 and 12 provide for the inspection by the Postal Officials of the Register of Messages kept on board.

Clauses 13 to 16 inclusive are formal clauses specifying the jurisdiction exercised by the Postmaster-General.

Clause 17 reads as follows :—

17. (1) If, and whenever, in the opinion of the Postmaster-General or any officer in command of one of His Majesty's ships of war, an emergency shall have arisen in which it is expedient for the public service that the Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for the said Postmaster-General, by warrant under his hand, to direct and cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty and to be used for His Majesty's service and, subject thereto, for such ordinary services as to the said Postmaster-General may seem fit, and in that event, any person authorised by the said Postmaster-General may enter upon the stations of the licensee, and take possession thereof and use the same as aforesaid.

(2) The Postmaster-General or any officer in command of one of His Majesty's ships of war may when he considers such an emergency as aforesaid to have arisen, instead of taking possession of the stations of the licensee, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus, either wholly or partly and in such manner as he may direct, and such persons may enter upon the licensee's premises accordingly, or the said Postmaster-General or officer may direct the licensee to submit to him all messages tendered for transmission or arriving by the licensed apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent and generally to obey all such directions with reference to the transmission of messages as the said Postmaster-General or officer may prescribe, and the licensee shall obey and conform to all such directions.

(3) In any such case as aforesaid, if the licensee shows that during the exercise of any of the powers aforesaid, his receipts for the licensed apparatus with respect to which the said powers have been exercised have been less than his receipts from the same source during a corresponding period, the Government shall pay to the licensee, as compensation for any loss of profit sustained by the licensee by reason of the exercise by the Postmaster-General of any of the powers hereby reserved, such sum as may be settled between the Postmaster-General and the licensee by agreement or as in case of difference may be determined by arbitration. Provided always that no such compensation as aforesaid shall be paid if and so far as the powers hereby reserved to the Postmaster-General are exercised for the purpose of preventing direct communication with any of His Majesty's enemies, and, save with the consent of the Postmaster-General no such compensation shall be paid if and so far as the powers aforesaid are exercised for the purposes of preventing direct or suspected communication with any of His Majesty's enemies or of protecting the interests of His Majesty under the apprenhension of impending war.

Clauses 18, 19, and 20 refer to Penalties and the inclusive privileges of the Postmaster-General.

The Schedule (above referred to) runs as follows :—

Name of Station.	Normal Range.	Description of receiving apparatus.	Wave Length.	Source of power and maximum output.	Maximum Power taken by Transmitting Instruments.		Frequency of Alternator if any.	Ship Charge.
					Volts.	Amps.		

NOTE.

In 1906 an agreement was made under which the Marconi Wireless Telegraph Company of Canada undertook to operate all the Labrador stations during the fishing season of each year, the Newfoundland Government to pay the company an annual royalty, and the revenue accruing from this traffic to go to the latter, who further agreed to forward all traffic over the Newfoundland Government Postal Telegraph System.

The success of this arrangement prompted the Government to propose an extension of the system on the Labrador by two or more stations—the Marconi Company to erect and operate these stations on the terms provided in the agreement. In the summer of 1910 stations were accordingly erected by the Marconi Company at Cape Harrison and Mokkovik. In 1911 it was agreed to establish a station between Indian Harbour and Cape Harrison to complete the chain on the Labrador.

After further negotiations, an important agreement was executed in December, 1912, which covers the following points: The old agreement terminating in 1916 is extended for a further period of ten years,

terminating in 1920; all other undertakings entered into in the earlier agreement will be continued until 1926. The Marconi Company has erected and is operating a station at Fogo, on the East Coast of Newfoundland—this station to be the property of the Marconi Company, and to be exempt from the Government tax of $4,000 during the term of the agreement.

NEW ZEALAND

A—Extracts from the Post and Telegraph Act (Part X.), 1908.

B—Extracts from Amendment Acts of 1911 and 1913.

C—Regulations under Act of 1913. (Ships not registered in New Zealand.)

D—Regulations (affecting ships registered in New Zealand).

E—Regulations as to ships being provided with Wireless (Oct., 1913).

A THE Post and Telegraph Department is responsible for the administration of wireless telegraphy in New Zealand. The permanent head of this Department is the Secretary of the General Post Office, at Wellington.

In July, 1914, Regulations were made for the control of ships carrying wireless telegraph apparatus while within the territorial waters of New Zealand. The Regulations relating to ship stations were also amended by new Regulations issued on September 7th, 1914.

No licenses are granted for amateur or experimental stations in New Zealand and the erection of such stations is prohibited.

The following extracts from Part X. of the Post and Telegraph Act 1908 and from the Post and Telegraph Amendment Acts, 1911 and 1913, relate to wireless telegraphy in the Dominion:—

> 162. The Governor may from time to time establish stations for the purpose of receiving and transmitting telegraph messages within New Zealand or between New Zealand and parts beyond New Zealand by what is commonly known as "wireless telegraphy," including in that expression every method of transmitting messages by electricity otherwise than by wires, whether such method is in use at the time of the coming into operation of this Act, or is hereafter discovered or applied.
>
> 163. The provisions of Part VII. of this division of this Act shall, as far as is applicable, *mutatis mutandis,* extend and apply to stations established under this part of this Act, and to communications by wireless telegraphy.
>
> 164. Every person who erects, constructs, or establishes any station or plant capable of transmitting or receiving wireless-telegraphic signals without having first obtained the consent of the Governor in Council is liable to a fine not exceeding five hundred pounds, and any plant, machinery, instruments, and material used by him for such purpose may be forfeited and dealt with as the Minister directs.

Part VII. of this division of the Act referred to deals with the construction and regulation of electric lines. It authorises the Governor

to establish electric lines and purchase lines and plant. He may make regulations as to the management, working and maintenance of any telegraph. Any officer or person employed in the working of any telegraph who improperly divulges the contents of any telegram transmitted or presented for transmission by such telegraph, or the purport of such telegram, is liable to a fine not exceeding one hundred pounds, or to imprisonment with hard labour for any period not exceeding six months.

EXTRACTS FROM ACTS OF 1911 AND 1913.

Post and Telegraph Amendment Act, 1911.

B 3. (1) The Minister of Telegraphs may, in accordance with regulations to be made in that behalf by the Governor in Council, grant licenses for the installation and working of apparatus for wireless telegraphy (within the meaning of Part X. of the principal Act) on board any ship registered in New Zealand, and whether on the high seas or in New Zealand waters.

(2) Subject to any such regulation, every such license shall be in such form and for such period, and shall contain such terms, conditions, and restrictions, as the Minister of Telegraphs thinks fit.

(3) The Governor may by Order in Council make such regulation as he thinks proper as to the granting of such licenses, and as to the form, period, terms, conditions, and restrictions thereof, and as to the fees payable in respect thereof.

Post and Telegraph Amendment Act, 1913.

9. (1) The Governor may from time to time, by Order in Council, make such regulations as he thinks proper governing the use of wireless telegraph apparatus on merchant ships, whether foreign ships or British ships not registered in New Zealand, while within the territorial waters of New Zealand.

(2) Such regulations may provide for the detention of any merchant ship on which a breach of the regulations has been made, pending the institution and determination of proceedings in respect of such breach and the recovery of any fine imposed in respect thereof.

C The following regulations are for the control of ships carrying wireless telegraph apparatus while within territorial waters of New Zealand.

WHEREAS by Section 9 of the Post and Telegraph Amendment Act, 1913 (hereinafter termed "the said Act"), it is provided that the Governor may from time to time by Order in Council make such regulations as he thinks proper governing the use of wireless-telegraph apparatus on merchant ships, whether foreign ships or British ships not registered in New Zealand, while within the territorial waters of New Zealand, and that such regulations may provide for the detention of any merchant ship on which a breach of the regulations has been made pending the institution and determination of proceedings in respect of such breach and the recovery of any fine imposed in respect thereof:

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in pursuance and exercise of the power and authority

conferred upon him by the said Act, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby make the following regulations; and doth hereby order that such regulations shall have effect on and from the date of publication of this Order in Council in the *New Zealand Gazette.*

REGULATIONS.

1. In these regulations, if not inconsistent with the context:—

"Territorial waters of New Zealand" means and includes all tidal waters included within the Dominion of New Zealand, and all parts of the open sea within one marine league of the coasts of that Dominion measured from low-water mark.

"Minister of Telegraphs" means the Minister of Telegraphs for the time being.

"Wireless Telegraphy" has the same meaning as in Section 162 of the Post and Telegraph Act, 1908.

"Telegraph" has the same meaning as in Section 119 of the Post and Telegraph Act, 1908.

"Naval signalling" means signalling by means of any system of Wireless Telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless-telegraph station, whether a coast station or a ship station.

"The Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

"Coast station" means a wireless-telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

"Ship station" means a wireless-telegraph station established on board a ship which is not permanently moored.

2. These regulations shall apply only to foreign merchant ships and to British merchant ships not registered in New Zealand, while such British or foreign ships are within the territorial waters of New Zealand.

3. All apparatus for Wireless Telegraphy on board a merchant ship while in the territorial waters of New Zealand shall be worked in such a way as not to interfere with Naval signalling, or with the working of any wireless-telegraph station lawfully established, installed, or worked in the Dominion of New Zealand or the territorial waters thereof; and, in particular, the said apparatus shall be so worked as not to interrupt or interfere with the transmission of messages between wireless-telegraph stations established on ships at sea and wireless-telegraph coast stations.

4. No apparatus for Wireless Telegraphy on board a merchant ship shall be worked or used while such ship is in any of the harbours of the Dominion of New Zealand, except with the consent in writing of the Minister of Telegraphs.

5. The foregoing regulations shall not apply to the use of Wireless Telegraphy for the purpose of making or answering signals of distress

6. If and whenever an emergency shall have arisen in which it is

expedient in the public interest that His Majesty's Government shall have control over the transmission of messages by the said apparatus, it shall be lawful for any officer of His Majesty's Navy or Army, or for any other person authorised in that behalf by the Admiralty, or by the Minister of Telegraphs, to take possession of or to cause the said apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty, and to be used for His Majesty's service and subject thereto for such ordinary services as to the said officer or person may seem fit; and in that event any person authorised by the said officer or person may enter upon any ship on which such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

7. Any such officer or person may in such event as aforesaid, instead of taking possession of the said apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the said apparatus, either wholly or partly, and in such manner as he may direct, and such persons may enter upon any ship on which the said apparatus is installed accordingly; or the said officer or person may direct the person or persons in charge of the said apparatus to submit to him, or any person authorised by him, all messages tendered for transmission or arriving by the said apparatus, or any class or classes of such messages, to stop or delay the transmission of any messages, or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer or person may prescribe, and the said person or persons in charge of the said apparatus shall obey and conform to all such directions.

8. If any breach of these regulations is committed by any person on board any ship while in the territorial waters of New Zealand, the person so committing the same and the owner and master of the ship shall be severally liable on summary conviction to a fine not exceeding £100.

9. Whenever the Minister of Telegraphs or the Secretary of the Post Office has reasonable cause to believe or suspect that any breach of these regulations has been committed on board any ship while in the territorial waters of New Zealand, he may give notice in writing to the Collector of Customs at any port in New Zealand to detain the ship, under Section 9 of the Post and Telegraph Amendment Act, 1913, until the sum of £100, or such smaller sum as may be specified in the notice, has been deposited with the Collector by or on behalf of the owner of the ship.

10. If on the receipt of that notice, or at any time within three months thereafter, the ship is found within such port, the Collector of Customs shall withhold the certificate of clearance of the ship, under Section 35 of the Customs Act, 1913, until and unless the aforesaid sum is deposited with him or the aforesaid notice of detention is withdrawn.

11. If within six months after the date of the offence in respect of which the ship has been detained a conviction for that offence is obtained against any person, the sum so deposited shall be available for the satisfaction of any fine and costs imposed or awarded by the conviction, and the residue, if any, shall be returned to the person by whom the deposit was made.

12. If within the period of six months aforesaid no such conviction is obtained, the sum so deposited shall be returned to the person by whom it was deposited.

Wireless Telegraph Regulations for Ship Stations

WHEREAS by Order in Council dated the twentieth day of November, one thousand nine hundred and eleven, and published in the *New Zealand Gazette* of the twenty-third day of November, one thousand nine hundred and eleven, regulations were made under the authority of the Post and Telegraph Amendment Act, 1911 (hereinafter termed "the said Act"), as to the granting of licenses for the installation and working of apparatus for wireless telegraphy on board any ship registered in New Zealand, and whether on the high seas or in New Zealand waters, and as to the form, period, terms, conditions, and restrictions thereof, and as to the fees payable in respect thereof: And whereas it is desirable to revoke such regulations, and to make others in lieu thereof:

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in pursuance and exercise of the power and authority conferred upon him by the said Act, and of all other powers and authorities in that behalf enabling him, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby revoke the regulations made by the above-mentioned Order in Council, and in lieu thereof doth hereby make the following regulations for the purposes hereinbefore mentioned; and doth hereby order that such regulations and the revocation of the regulations first before recited shall have effect on and from the date of publication of this Order in Council in the *New Zealand Gazette.*

Regulations.

1. In these regulations, if not inconsistent with the context:—

"Minister of Telegraphs" means the Minister of Telegraphs for the time being.

"Wireless Telegraphy" has the same meaning as in Section 162 of the Post and Telegraph Act, 1908.

"Telegraph" has the same meaning as in Section 119 of the Post and Telegraph Act, 1908.

"Naval signalling" means signalling by means of any system of Wireless Telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless-telegraph station, whether a coast-station or a ship-station.

"The Admiralty" means the Commissioners for executing the office of Lord High Admiral of the United Kingdom of Great Britain and Ireland.

"The International Telegraph Convention" and "the International Telegraph Regulations" mean respectively the International Convention of St. Petersburg dated the 10th-22nd July, 1875, and the service regulations made thereunder; and include respectively any modifications of the convention or regulations made from time to time.

"The Radio-Telegraph Convention, 1912," means the convention signed at London on the 5th day of July, 1912, and the service regulations made thereunder; and includes any modification of the convention or regulations made from time to time.

"Coast-station" means a wireless-telegraph station which is established on land or on board a ship permanently moored, and which is open for the service of correspondence between the land and ships at sea.

"Ship-station" means a wireless-telegraph station established on board a ship which is not permanently moored.

2. The Minister of Telegraphs may, at the request of any person or company desirous of establishing, installing, working, and using on ships belonging to such person or company, and registered in New Zealand, apparatus for Wireless Telegraphy, grant to such person or company (hereinafter called "the licensee") a license, in the form of the Schedule hereto, for the period, upon the terms, and subject to the conditions and restrictions hereinafter appearing.

3. Each ship-station is bound to exchange radio-telegrams with any coast-station, or with any other ship-station, without distinction as to the radio-telegraph system adopted by that station.

4. Each ship-station shall be of such class mentioned in Article 13 of the Service Regulations annexed to the Radio-telegraph Convention, 1912, as is specified in the license issued in respect thereof, and the equipment of the station, hours of duty observed, and other requirements shall be appropriate to such class in accordance with the provisions of the Radio-Telegraph Convention, 1912.

5. The apparatus used at all ship stations shall, as far as possible, be in keeping with scientific and technical progress. The waves emitted must be as pure and as little damped as possible.

6. The apparatus must be capable of transmitting and receiving at a speed of at least equal to twenty words per minute, the word being reckoned at the rate of five letters.

7. The apparatus shall be so constructed as to be capable of using wave-lenghts of 600 and 300 metres as measured by the standard of measurement in use by the Post and Telegraph Department for the time being; and such other wave-lengths not exceeding 600 metres as shall be authorised from time to time by the Minister of Telegraphs: Provided always that the wave-length of 600 metres shall normally be used for communication, and, further, that the wave-length of 1,800 metres may be used for transmission in the exceptional case referred to by Article 35 (2) (*a*) of the Service Regulations annexed to the Radio-Telegraph Convention, 1912; Provided, further, that only wave-lengths of 600 metres shall be used by the licensee during the period of any war in which the United Kingdom is engaged.

8. The licensed apparatus shall not be used by the licensee, or by any other person either on behalf or by permission of the licensee, for the transmission or receipt of messages except messages authorised by these regulations; and the licensee shall not, except with the consent in writing of the Minister of Telegraphs, send or receive messages from or at the licensed apparatus when in any harbour in the Dominion of New Zealand.

9. (1) The licensee shall not by the transmission of any message by means of the licensed apparatus, or otherwise by the use of the licensed apparatus, interfere with naval signalling.

(2) If the Admiralty are of opinion that the working of the licensed apparatus at any ship-station is inconsistent with the free use of naval signalling, the licensee shall, when required in writing by the Minister of Telegraphs so to do, close the said station.

(3) These provisions for the protection of naval signalling shall be construed to be without prejudice to the generality of any other provisions of the license.

10. The licensee shall observe the International Telegraph Convention and International Telegraph Regulations so far as the said convention and regulations are capable of being applied to Wireless Telegraphy in common with ordinary land and submarine telegraphy.

11. The licensee shall observe the provisions of any regulations from time to time made under the provisions of the Post and Telegraph Act, 1908, and its amendments, by the Governor in Council or by the Minister of Telegraphs in relation to the conduct of wireless-telegraph business, so far as the same are applicable to the licensee

12. The licensee shall observe the provisions of the Radio-Telegraph Convention, 1912.

13. The licensee shall comply with all such directions and observe all such rules as may be given or made by the Minister of Telegraphs from time to time for the purpose of preventing interference with the working of any other wireless-telegraph station, and for enabling the messages exchanged by means of the licensed apparatus to be distinguished from those emanating from any other wireless-telegraph station.

14. The licensed apparatus shall not, without the consent of the Minister of Telegraphs, be altered or modified in respect of any of the particulars referred to in the license issued in respect thereof, and such apparatus shall at all times be maintained in good working order.

15. Except as provided in these regulations, the licensee shall transmit messages by means of the licensed apparatus on equal terms, without favour or preference, whether as regards rates of charge, order of transmission, or otherwise.

16. The licensee shall, so far as possible, receive from ships and light-stations all requests for assistance and all signals of distress, and shall answer such requests and signals and retransmit them with the least possible delay, and with priority over all other messages, to the proper authorities by means of the licensed apparatus or by any other means in the power of the licensee.

17. The licensed apparatus at ship-stations shall be worked only by a person or persons holding a certificate or certificates issued or recognised by the Minister of Telegraphs. Certificates shall be granted to persons of British nationality possessing the qualifications prescribed by the Radio-Telegraph Convention, 1912, and shall be in such form and subject to such conditions, directions, or rules as the Minister of Telegraphs shall from time to time prescribe; and such certificates may at any time be withdrawn at the discretion of the Minister of Telegraphs in case of misconduct, or breach on the part of the holder of the Radio-Telegraph Convention, 1912, or of any conditions, directions,

or rules prescribed by the Minister of Telegraphs for the guidance of operators or for the working of such ship-stations.

18. (1) The licensee, his servants and agents, shall not divulge the contents or the purport of the contents of any message, or make any use whatever of any message coming to his or their knowledge, other than to the addressee or his authorised agent, or to properly authorised officials of His Majesty's Government or of the Minister of Telegraphs, or to a competent legal tribunal.

(2) The licensee shall render to the Minister of Telegraphs such accounts as the Minister of Telegraphs shall direct in respect of all charges due or payable under the Radio-Telegraph Convention, 1912, in respect of messages exchanged between the licensed ship-stations and coast stations, and shall pay to the Minister of Telegraphs, at such times and in such manner as the Minister of Telegraphs shall direct, all sums which shall be due from the licensee under such accounts.

19. The licensee shall keep full accounts, records, and registers of all messages transmitted by means of the licensed apparatus; and in such registers each of such messages shall be accompanied by its identifying number and date, and full particulars of its place of origin and of ultimate destination, and such further particulars as the Minister of Telegraphs shall from time to time reasonably require to be shown. The licensee shall preserve all used message-forms written and printed, and transcripts of messages, and all other papers for such period as is from time to time prescribed by the Radio-Telegraph Convention, 1912, and, in default of any provisions on the subject in the said convention, for such period as is from time to time prescribed by the International Telegraph Regulations; and such registers and message-papers shall be open to the inspection of the Minister of Telegraphs or his authorised officers.

20. The Minister of Telegraphs, and any agent authorised in that behalf in writing by him, may at all reasonable times enter upon any licensed ship-station for the purpose of inspecting, and may inspect, any apparatus fixed or being in such station for the purpose of sending and receiving messages by wireless telegraphy, and all other telegraphic instruments and apparatus fixed or being in such station, and the working and user of such apparatus and telegraphic instruments.

21. The licensee shall carry on every ship on which a ship-station is established a print or copy of the license, certified under the hand of an appropriate officer of the Minister of Telegraphs to be a true copy, and shall produce such print or copy for inspection if required to do so by the competent authorities of the countries where the ship calls, and also such documents as may be prescribed by the Minister of Telegraphs for the purpose of enabling the licensee to communicate with coast-stations and ship-stations, in accordance with the Radio-Telegraph Convention, 1912.

22. (1) Every license shall be in force from the date of the granting thereof until the 31st December of the year in which it is issued, and no longer; but may be renewed from year to year.

(2) The licensee shall pay to the Minister of Telegraphs for and in respect of the license granted, and of every renewal thereof, a royalty of 5s. in respect of each ship-station included in the license.

(3) All royalties payable under any license shall be payable on the date of the granting or renewal thereof, as the case may be.

23. Except with the consent in writing of the Minister of Telegraphs, the licensee shall not assign, underlet, or otherwise dispose of or admit any other person or body to participate in the benefit of any license.

24. If and whenever an emergency shall have arisen in which it is expedient in the public interest that His Majesty's Government shall have control over the transmission of messages by the licensed apparatus, it shall be lawful for any officer of His Majesty's Navy or Army, or for any other person authorised in that behalf by the Admiralty, or by the Minister of Telegraphs, to take possession of or to cause the licensed apparatus or any part thereof to be taken possession of in the name and on behalf of His Majesty, and to be used for His Majesty's service and subject thereto for such ordinary services as to the said officer or person may seem fit; and in that event any person authorised by the said officer or person may enter upon any ship on which any such apparatus is installed and take possession of the said apparatus and use the same as aforesaid.

25. Any such officer or person may in such event as aforesaid, instead of taking possession of the licensed apparatus as aforesaid, direct and authorise such persons as he may think fit to assume the control of the transmission of messages by the licensed apparatus either wholly or partly and in such manner as he may direct, and such persons may enter upon any ship on which any apparatus is installed accordingly; or the said officer or person may direct the licensee, his servants or agents, to submit to him, or any person authorised by him, all messages tendered for transmission or arriving by the licensed apparatus, or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him or his agent, and generally to obey all such directions with reference to the transmission of messages as the said officer or person may prescribe, and the licensee, his servants or agents, shall obey and conform to all such directions.

26. In any of the following cases, that is to say :—

(*a*) In case any sum of money which ought to be paid by the licensee to the Minister of Telegraphs under or by virtue of these regulations shall be in arrear and unpaid for one calendar month after the time at which the same ought to be paid under or by virtue of the provisions herein contained; or

(*b*) In case of any breach, non-observance, or non-performance by or on the part of the licensee, his servants or agents, of any of the provisions (other than a provision for the payment of money) or conditions herein contained,—

then and in any such case the Minister of Telegraphs may, by notice in writing, revoke and determine the license as to all or any of the ship-stations thereby licensed, and thereupon the said license shall absolutely cease, determine, and become void as to all or any of the said ship-stations, as the case may be, but without prejudice to any right of action or remedy which shall have accrued to His Majesty under these regulations or otherwise.

27. Nothing in these regulations shall prejudice or affect the right of the Minister of Telegraphs from time to time to establish, extend, maintain, and work any system or systems of telegraphic communication (whether of a like nature to those licensed hereunder or otherwise) in such manner as he shall in his discretion think fit. Neither shall anything herein contained prejudice or affect the right of the Minister of Telegraphs from time to time to enter into agreements for or to grant licenses relative to the working and use of telegraphs (whether of a like nature to those licensed hereunder or otherwise) or the transmission of messages in any part of New Zealand by means of Wireless Telegraphy, or by any other means, with or to any person or persons whomsoever upon such terms as he shall in his discretion think fit. And (save as in these regulations expressly provided) nothing herein contained shall be deemed to authorise the licensee to exercise any of the powers or authorities conferred on or acquired by the Minister of Telegraphs by or under the Post and Telegraph Act, 1908.

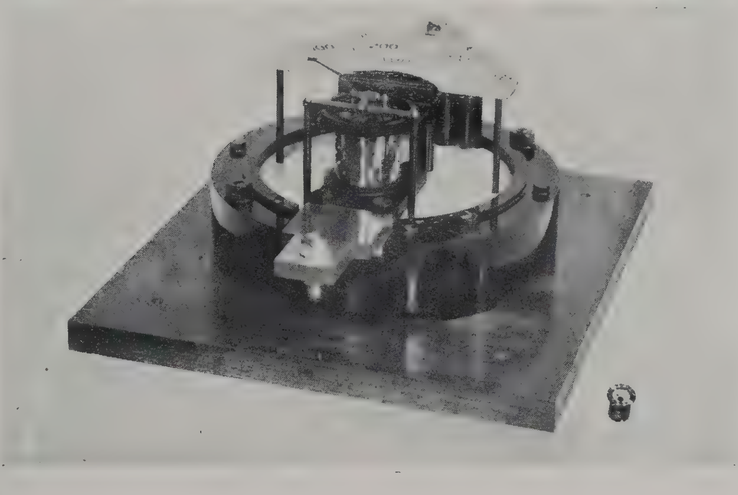
28. Any notice, request, or consent (whether required to be in writing or not) to be given by the Minister of Telegraphs under these regulations may be under the hand of the Secretary for the time being of the Post and Telegraph Department, and may be served by sending the same in a registered letter addressed to the licensee at the office or place of residence for the time being of the licensee, or, if such notice, request, or consent relates to any particular ship-station, by delivery to the master of the ship upon which such station is installed; and any notice to be given by the licensee under these regulations may be served by sending the same in a registered letter addressed to the Secretary, General Post Office, Wellington.

29. All licenses heretofore issued under the regulations hereby revoked shall continue in force, subject to the regulations under which they were issued, until the expiry of the current term thereof, but shall not be capable of renewal under the regulations so revoked.

SCH

LICENSE FOR THE INSTALLATION AND WORKING OF APPARATUS F

Name of Ship on which Station established.	Class of Ship station under the Radio-telegraph Convention, 1912.	Call-signal.	Nature of Services Performed.	Hours of Service.	Normal Range of Signalling in Nautical Miles.	
					By Night	By Day.
1.	2.	3.	4.	5.	6.	7.



A. MARCONI VACUUM AMPERE GAUGE.

B. MARCONI HIGH-FREQUENCY SHUNTLESS AMMETER FOR HEAVY CURRENTS.

(*The large instrument is of* 400 *amperes capacity; the miniature instrument in the bottom right-hand corner is of* ·4 *amperes capacity.*)

[*To face page* 288.

REGULATIONS

AS TO SHIPS BEING PROVIDED WITH WIRELESS TELEGRAPHY APPARATUS.

ORDER IN COUNCIL.

E At the Government House, at Wellington, this twentieth day of October, 1913.

Whereas it is enacted by Section 50 of the Shipping and Seamen Amendment Act, 1909, that the Governor may from time to time by Order in Council make regulations requiring ships registered in New Zealand, and carrying passengers, to be provided with apparatus for transmitting messages by means of wireless telegraphy, and may by such regulations prescribe fines not exceeding fifty pounds for any breach thereof by the owner or master of a ship. And whereas it is desirable to make such regulations:

Now, therefore, His Excellency the Governor of the Dominion of New Zealand, in exercise of the hereinbefore recited power and authority, and acting by and with the advice and consent of the Executive Council of the said Dominion, doth hereby make the following regulations, and doth hereby order that they shall come into force on July 1st, 1914:

Provided that, if in his opinion the circumstances justify it, the Minister of Marine may exempt any steamship from the operation of these regulations, and may limit the time for which any such exemption shall be in force.

REGULATIONS.

1. Every steamship registered in New Zealand, and carrying passengers, which is engaged in the foreign or inter-colonial trade, except steamships trading to the Chatham, Auckland, Campbell, and Antipodes Islands, and every home trade steamship which is authorised by her ordinary survey certificate to carry not less than 150 passengers at sea, shall not leave or attempt to leave any port in New Zealand

DULE.

WIRELESS TELEGRAPHY ON BOARD SHIPS OWNED BY .

Character of Apparatus.		Power.		
System of Radiotelegraphy with the Characteristics of the System of Emission.	Wave Lengths (in Metres).	Source and Maximum Output.	Maximum to be normally taken by Sending Instruments.	If Alternator is used, Number of Cycles per Second.
8.	9.	10.	11.	12.

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unless such steamship is equipped with an efficient apparatus for radio communication in good working order, to be operated by a person skilled in the use of such apparatus, which apparatus shall be capable of transmitting and receiving messages over a distance of at least one hundred miles, day or night.

2. Ships required by these regulations to carry the apparatus prescribed above shall be placed in the third class as defined by Article XIII. of the Detailed Service Regulations appended to the International Radiotelegraph Convention, 1912—that is, they are not bound to perform any regular listening service.

3. The Minister of Marine may appoint inspectors for the purposes of these regulations, and such inspectors and superintendents of Mercantile Marine may visit any steamship required by these regulations to be equipped with apparatus for radio communication before they leave port, and ascertain if they are equipped with such apparatus the operation of which shall be carried out by a telegraphist holding a certificate as prescribed by Article X. of the Detailed Service Regulations attached to the International Radiotelegraphic Convention.

4. Where a passenger steamship subject to these regulations is without the apparatus and the operator prescribed, and is about to attempt to leave port, an inspector or superintendent shall :—

(*a*) Notify the master of the fine to which he will be liable, and of the particulars in respect of which the law has not been complied with;

(*b*) Notify at once the Collector of Customs, who may thereupon withhold the vessel's clearance until the requirements of these regulations are complied with;

(*c*) Prepare a report in writing of his action and transmit it to the Collector of Customs, who shall forward a copy to the Secretary of the Marine Department.

5. An inspector or superintendent may, at any time before a vessel subject to these regulations leaves port, require the master to give him a certificate, in the form set forth in the appendix hereto, that the wireless apparatus of his ship is efficient and in good working order, and the master shall give such certificate before the vessel leaves port.

6. The power necessary to transmit signals shall at all times, while the vessel is under way, be available for the wireless operator's use.

7. Subject to the above regulations, the installation and operation of the apparatus required by them to be fitted shall be in conformity with the requirements of the Post and Telegraph Act, 1908, and its amendments, and the regulations made thereunder.

8. Any master or owner of a steamship committing a breach of these regulations is liable to a fine not exceeding £50.

APPENDIX.

This is to certify that the wireless operator in principal charge of the apparatus for radio communication on the s.s. "   " has this day certified to me in writing that the said apparatus is efficient and in good working order.

(Signed) ....

Master.

NIGERIA (NORTHERN)

THE following Proclamation providing for the control by the Governor of electrical communication by Wireless Telegraphy was issued in 1904:—

1. This Proclamation may be cited as the Wireless Telegraphy Proclamation.

2. No person shall import, keep, use or establish any apparatus or installation for transmission of messages by wireless telegraphy without previously obtaining from the Governor a licence setting forth the terms and conditions upon which the same is granted.

3. Any person infringing this Proclamation shall be liable upon conviction in addition to confiscation of every such apparatus and installation to a penalty not exceeding £500 or in default to imprisonment for a term not exceeding twelve months or to both.

4. It shall be lawful for the Governor from time to time by Proclamation to prescribe the terms and conditions upon which, if at all, such licence is granted.

NIGERIA (SOUTHERN)

A—Wireless Telegraphy Ordinance, 1913.
B—Regulations.

A 1. This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. In this Ordinance, the following words and expressions shall have the meanings hereby assigned to them unless there is something in the subject or context repugnant to such constructions:—

"Wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received.

"Colony" includes Protectorate.

3. (1) A person shall not establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations made under this Ordinance.

5. (1) The Governor may make regulations for carrying into effect the purposes of this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or revoked by regulations made under the authority of this section.

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(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a District Commissioner is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by the Inspector-General of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on conviction before a District Commissioner, anything in the Supreme Court Ordinance to the contrary notwithstanding, to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

8. Nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than that of wireless telegraphy.

9. The Wireless Telegraphy Ordinance and the Wireless Telegraphy (Amendment) Ordinance, 1912 [The Year-Book of Wireless Telegraphy and Telephony, 1913, p. 183], are hereby repealed.

SCHEDULE.—Section 5 (2).

Regulations.

B (I.) All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(*a*) Naval signalling, or

(*b*) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(II.) In these Regulations "Naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and

Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

(III.) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

(IV.) For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

(V.) Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

(VI.) These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

NORWAY

A—Law of 24th July, 1914.
B—Law of 18th August, 1914.
C—Regulations.
D—Ship Licence.
E—Notice to Mariners.

A LAW of July 24th, 1914, supplementing and amending the Law of April 29th, 1899, relating to the forwarding of communications by aid of telegraphic conductors or such like installations and relating to the repeal of Law No. 2 of July 16th, 1907:—

Section 1. On ships which sail under the Norwegian flag and which do not belong to the Norwegian Navy, stations or installations for telegraphing or telephoning by wireless both within and without the boundaries of the Kingdom may only be installed and worked after an authorisation obtained in advance, which will be granted by the King, or whoever may be authorised thereto, on certain definite conditions for a stipulated period of time. The permission may at any time be withdrawn if the conditions imposed are not adhered to.

Detailed Rules and Regulations relating to the fitting up and working of such stations or installations shall be drawn up by the King.

On ships which sail under a foreign flag and are within Norwegian territorial waters, wireless telegraphing and telephoning can only be carried on—even if they have permission for same from the authorities of the foreign country—subject to observance of the provisions which are made with respect thereto by the King or whomsoever he may have authorised for the purpose who may, moreover, forbid all telegraphing or telephoning from such ships, whenever circumstances may be considered to require it.

Section 2. The exceptions mentioned in the Law of April 29th, 1899, under Section 1, 2nd paragraph, relating to the working of plant which may be used by a commune or private person for his own use, or such as railways may install for their own working, shall not apply so far as the working of installations for wireless telegraphy or telephony are concerned.

Section 3. Any infractions of the aforementioned conditions shall be punished pursuant to the provisions laid down in the Law of April 29th, 1899, Section 6.

Moreover, any transgression of the rules or provisions which are drawn up with regard to Section 1 of the present Law shall be punished by fines.

Section 4. This Law shall come into force immediately. The Law of July 16th, 1907, containing additions and amendments to the Law of April 29th, 1899, relating to the forwarding of communications by means of telegraph lines or similar installations, is hereby repealed.

B The following paragraph, taken from the "Law of August 18th, 1914," amending the law of April 29th, 1899, relates directly to Wireless Telegraphy :—

Within the boundaries of Norway, or its territorial waters, stations and installations for wireless telegraphy and telephony may only be erected or worked after permission has been obtained from the King or whomever he may authorise thereto, and on such conditions as are laid down in the said permission.

C The following regulations are based on the law of July 24th, 1914 :—

1. No radiotelegraphic station on board a foreign vessel within the limits of Norwegian territorial waters can be used without a special licence.

Application for such licence must be made to the Ministry of Telegraphs, which Ministry, after consultation with the Ministry of Marine, will decide on the application.

2. The licence granting the right to use wireless telegraphic stations within the radius of Norwegian territorial waters may be limited to definite places and to fixed hours of the day.

Wireless transmission of messages must be stopped immediately on the order of the Ministry of Telegraphs, Ministry of Marine, or of any coast station established by the aforesaid Ministries.

3. If the vessel is in a Norwegian port situated within a radius of 5 kilometres from the nearest telegraph station, the station on board the vessel cannot communicate either with Norwegian coast stations or with foreign coast stations.

Without a special licence, a wireless station on board a vessel in a Norwegian port cannot be used for the exchange of messages with other ship stations, unless for the purpose of advising accidents.

4. However, the preceding provisions do not apply to foreign ships of war, as far as the interchange of messages between themselves is concerned.

It is the duty, nevertheless, of stations on board foreign warships to conform to the provisions in Article 2, Paragraph 2, above.

5. If a station is used when a ship is in Norwegian territorial waters this station must conform to the provisions of the International Telegraphic Convention, and the regulations appended thereto.

D NORWEGIAN LICENCE CONDITIONS

Conditions for erection and working of Radiotelegraph and Radiotelephone stations on board ships (ship-stations).

FORM OF LICENCE.

According to the Law of 16th July, 1907, and the Royal Decree of the 30th August, 1913 permission is hereby given to................
....
to erect and work on board the ship.............................
a Radiotelegraph Station (Radiotelephone Station) in accordance with the Table of Particulars on the last page of this form. The permission is valid from...............to.....................
and is given on the following conditions.

1. The station shall belong to the ....class of stations as specified in the International Radiotelegraph Convention Service Regulations, Art. XIII b, and will thus have.....................
service.

2. The installation shall be effected in every respect in accordance with the installation plan approved by the Telegraph Department, and must not be departed from without the agreement of the said department. Ships belonging to the 1st and 2nd classes must be provided with emergency Radiotelegraph installations, as laid down in the existing Radiotelegraphic Service Regulations.

3. The holder of the licence shall as far as the erection and working of the station is concerned, be under the obligation in every respect to adhere to existing international agreements with annexed regulations concerning Radiotelegraphy and Telephony when such International Agreements have been adhered to by Norway, and further he shall abide by such regulations as may be issued by the Department for Public Works or by the Telegraph Department.

4. The Telegraph Department shall have the right, in the interests of the service and after the conferring with the Naval Department, to require any alterations to be made in the wave lengths employed as given in the above-mentioned Table of Particulars within the limits laid down in the regulations, either as a temporary or permanent measure in the working of the station.

5. The holder of the licence shall recognise the importance of keeping the station in the best possible condition in order to ensure good working.

6. The station shall be under the obligation to forward telegrams to and from persons on board, with due regard to existing general rules for such work. Further, the station shall be obliged to communicate with other ship or coast stations without regard to the system of apparatus employed at those stations.

7. The answering of signals from ships in distress and the correspondence caused thereby shall have priority over all other correspondence.

8. During the ship's stay in a Norwegian Port the station must not be used for communication either with Norwegian or with Foreign coast stations. Neither shall the station, while the ship is in a Norwegian port, be used for communication with other ship stations without special permission, or unless such communication is effected with a view to prevent accidents. Special permission is granted by the Telegraph Department after conferring with the Naval Department.

9. The call signal of the station is..........................

10. The tax due to the ship station is...................(ore) (...............centimes) per word with a minimum of......(ore) (...............centimes) per message.

11. The service on board must be performed by one telegraphist, or, for ship stations of Class I, by two or more telegraphists holding a certificate issued by the Telegraph Department.

This certificate states that the telegraphist concerned possesses the knowledge and abilities as prescribed in the existing International Regulations.

The granting of such certificate depends upon the passing of an examination arranged by the Telegraph Department. Petty Officers and Seamen belonging to the Navy's staff of mechanics, and who are specially trained as Radiotelegraphists for the Navy, are entitled to such certificate when they can prove to the Telegraph Department that they have the necessary knowledge of the handling of telegrams and when they procure from the authority concerned in the Navy, a testimonial to the effect that they satisfy the International Regulations as far as their knowledge of the instruments, ability, etc., is concerned. Without the permission of the Telegraph Department other than Norwegian subjects must not be employed for the service on board.

The holder of the licence will take the best possible care that the contents of messages do not come to the knowledge of unauthorised persons.

The telegraphist will make the usual promise of secrecy.

12. The holder of the licence is responsible for the charges that are due for the transmission of the messages sent from the ship station, including the charge for the coast station.

The Telegraph Administration, on its side, pays to the holder of the licence the charges that are due to the ship station for the messages addressed to the ship. "Journals" (abstracts) should be kept in respect of the correspondence (traffic). These "Journals," together with the originals of the transmitted messages and such other documents as may be required, are to be sent to the Telegraph Department, as far as possible, at the end of each month.

The mutual settlement of the charges will take place quarterly or monthly, as may be arranged between the Telegraph Department and the holder of the licence. However, with the agreement of the Telegraph Department the holder of the licence may make other arrangements for the accounting of stations on ships that are exclusively engaged in Foreign Waters. Such arrangements may be

made with the Administrations to which the coast stations that the ships usually make use of belong. Similarly, the Telegraph Department may make arrangements other than those mentioned above with Foreign Administrations.

13. The station is subject to such supervision as may be decided by the Department for Public Works, and one or more of the Officials appointed by the Department for Public Works or by the Telegraph Department should be given opportunity to inspect the station.

For the supervision of the station the holder of the licence has to pay a certain fee that will be decided by the Department.

14. When State or other public reasons so demand it, the Department for Public Works or the Naval Department may partly or entirely prohibit the transmission of any kind of traffic correspondence at the station without admitting any claim for compensation. Likewise, in the interests of the service, the Telegraph or Naval Department can prohibit with the same effect all correspondence from the station, either at certain places or at certain times of the day.

15. The Norwegian State has the right to take over the station with six months' notice against compensation, the amount of which will be fixed after valuation should it not be possible to arrive at an amicable adjustment.

The valuation will be made by a Committee of three members, whereof one member is nominated by the owner, one by the Telegraph Department and one by the Department of Public Works.

The member nominated by the Department for Public Works will be the Chairman of the Committee.

The questions put before the Committee will be decided solely by majority of votes.

In case the owner has not, within thirty days after the reception of the invitation, made any such nomination as mentioned above, or in case the member nominated by him fails to attend, the valuation will then with obligatory effect be decided by the other nominees.

In case of equal voting the vote of the Chairman shall decide the matter.

In the valuation regard shall only be paid to the technical value of the station at the moment of valuation, the income, etc., derived from the station not being taken into account.

The valuation shall take place within a time-limit fixed by the Telegraph Department and will be at the public expense.

16. The licence shall become null and void in case :—

(*a*) Use is not made of it within a year of its issue.

(*b*) Breach is made of any of its regulations.

(*c*) The ship ceases to fly the Norwegian flag.

17. Disputes as to the intent and meaning of this licence shall, with obligatory effect, be decided by the King.

The Telegraph Department,

CHRISTIANIA..................19

....

SCHEDULE.

System.	Type of Installation.	Normal range (by day)	Wave-lengths (the normal wave to be underlined).	Description of Transmitting and Receiving Instruments. (Detailed sketch of connections attached.)	Type of Aerial. (Sketch with measurements attached.)	Description of Emergency Gear (for ship stations of 1st and 2nd classes. Detailed sketch of connections attached).	Remarks.

E

THE State Telegraph Department issued in December, 1908, the following "Notice to Mariners" applying to wireless telegraph equipments on board ships in Norwegian territorial waters:—

1. Wireless telegraph or wireless telephone stations on board foreign vessels must not be operated, except by special permission, within Norwegian territorial waters. Requests for such permission must be sent to the Telegraph Department, which will communicate its decision after conference with the Marine Department.

2. Permission to operate the stations on board foreign vessels within Norwegian territorial boundaries may be restricted to certain fixed places, or to certain fixed periods of the 24 hours. Correspondence by means of the wireless apparatus shall be at once suspended whenever it shall be so desired by the Telegraph Department, the Marine Department, or by any one of the coast stations under their authority.

3. During the stay of a vessel in a Norwegian harbour, within a distance of 5 kilometres ($2\frac{7}{10}$ths miles) from the nearest telegraph station, the station on board a foreign vessel must not be employed for telegraphing either with Norwegian or foreign coast stations. Without special permission, the station during a vessel's stay in a Norwegian harbour must not be employed for communicating with other ship stations except for the purpose of preventing accidents.

4. The regulations above mentioned do not, however, apply to stations on board vessels of war belonging to foreign powers, which carry on mutual correspondence. Such stations are, however, bound to submit themselves to the regulations contained in the second clause of Section 2.

5. Whenever the station on board a foreign vessel is employed during her stay in Norwegian territorial waters, this shall be done subject to the regulations contained in the International Telegraph Convention, with the rules pertaining thereto.

NYASALAND PROTECTORATE

THIS Ordinance may be cited as "The Wireless Telegraphy Ordinance," 1908.

2. No person shall establish or use any apparatus or installation for the purpose of operating wireless telegraphs without a licence from the Governor.

Any person contravening this section shall be liable on conviction to a fine not exceeding £100 or to imprisonment with or without hard labour for a term not exceeding twelve months with or without the option of a fine, and in addition any apparatus or installations in respect of which an offence under this section is committed may be forfeited and sold or disposed of as the Governor may direct.

3. The Governor in Council may from time to time make, and when made shall publish in the *Gazette,* rules prescribing the terms and conditions upon which licences to establish or use apparatus or installations for the purpose of operating wireless telegraphs may be granted, and may impose a penalty on conviction for breach of any rules so made of a fine not exceeding £50 or imprisonment with or without hard labour for a term not exceeding six months with or without the option of a fine, and such Rules may further provide for forfeiture and sale or disposal as the Governor may direct of any such apparatus or installations as aforesaid.

PORTUGAL

A—Act of 15th July, 1913.

B—Regulations.

THE Direction-General of Posts and Telegraphs deals with all matters relating to the general applications of Wireless Telegraphy for commercial purposes and for ship and shore communication. The Ministry of War, Marine and Colonies controls the special applications of Wireless Telegraphy, when intended for purposes of national defence, in the Army and Navy.

The following Act was approved on July 15th, 1913 :—

A 1. On the expiration of a period of three months from the approval of the Regulation for the execution of the present law, no Portuguese steam vessel, with accommodation for more than fifty passengers (including crew), shall be permitted to sail from any port without having installed a wireless telegraph apparatus of the system which suits it best, in good working order, and capable of dispatching and receiving radiotelegrams within a radius of action which must never be less than 100 miles.

(*a*) From this provision those steamers are excepted which navigate only between ports situated at distances of less than 200 miles.

(*b*) For steam vessels, which navigate in the Colonies where there are coastal radiotelegraph stations, and which only occasionally come to the Metropolis, the period granted for the installation of wireless telegraphy, to which the present article refers, shall be six months.

2. The wireless telegraph material of a vessel, and the respective service of transmission and reception of radiotelegrams, shall be under the charge of one or more duly qualified telegraphists.

§ The number of telegraphists, their qualifications, and that of the indispensable auxiliary staff, the organisation of their technical

instruction, provisions with respect to the service of supervision, conditions of the installation of the apparatus, and the official verification of their working, shall be determined pursuant to the Regulation drawn up for the execution of the present law.

3. It is the province of the captain of the vessel to give instructions and orders for the complete carrying out of the Laws and Regulations in force with respect to the radiotelegraphic service, and he shall exercise the necessary supervision, carrying out and causing to be carried out any provisions which he may consider advantageous for the good working of the said service.

4. The captain shall be held responsible for any negligence in complying with the requirements of Article 1, and on conviction he shall be liable to a fine not exceeding Rs.200 and the suspension of his master's certificate for one year.

5. Negligence or failure on the part of the captain to carry out the provisions of Article 3 shall render him liable to a fine not exceeding Rs.50, which may be accompanied with imprisonment not exceeding one month after the first offence.

6. If there should be a disaster, stranding or loss of the vessel, resulting from the lack of vigilance of the telegraph staff. and the said fault was due to the negligence of the captain in failing to carry out and causing to be carried out the provisions in force relating to the radiotelegraph service, the captain shall be liable to a fine not exceeding Rs.200, accompanied or not, according to the gravity of the offence, with suspension of his certificate for a period from one to five years.

If the serious injury, or the death, of one or more persons should result from the disaster, the penalties applicable shall be respectively those laid down in Articles 368 and 369 of the Penal Code.

7. The offences referred to in Articles 4, 5 and 6 constitute maritime crimes, and shall be judged by the Commercial Maritime Tribunal pursuant to the Disciplinary Code of the Mercantile Marine.

8. All the wireless apparatus intended for Portuguese vessels shall be exempt from Customs and Municipal Duty.

9. Any legislation contrary hereto is hereby repealed.

B THE following regulations were issued on August 29th, 1913:—

1. Ships may be equipped with any wireless telegraph apparatus which is in keeping with scientific progress.

2. The shipping or any other company may establish and work a wireless telegraph station on board ship. The station must possess a licence granted by the Government of the nationality to which the ship belongs. The "class" of the station is mentioned in the licence.

3. There are three classes:—

(*a*) Long voyage passenger steamers with accommodation for more than 150 passengers must maintain continuous service.

(*b*) The same type of steamer with accommodation for less than 150 passengers must maintain continuous *receiving* service, whereas the transmission may be limited.

(*c*) Cargo or fishing boats, or vessels carrying more than 50 persons (including crew), may have limited service.

4 and 5. Wave-lengths of 300 m, 600 m, and more than 1,800 m may be employed. Small boats may work on a 300 m wave when sending, but *600* when receiving. The waves must be as pure and as undamped as possible.

The oscillator must not be directly connected to the antennæ, except in case of distress, or on certain small steamers where the energy employed in the primary does not exceed 50 watts.

6. The cabin must be divided into two parts so that the transmitting gear and the spark gap may be separated from the receiving apparatus. Double walls must be used to isolate the interior from the exterior.

7. The instruments must be able to receive and send 100 letters per minute.

8. New installations employing a power of more than 50 watts must possess such arrangements as will enable them to have a range inferior to their normal, the smallest being approximately 15 miles. All old stations must be brought to this standard as soon as possible.

9. The receiving instruments must be able to tune for waves up to 600 m, being highly protected against perturbations.

10. The power measured at the terminals of the generator must not exceed 1 k.w. in normal circumstances. An increase is allowed when a station desires to communicate with a land station other than the nearest, at a distance of more than 200 miles from the nearest land station, and when, in exceptional circumstances, the communication cannot be effected with 1 k.w.

11. First and second class steamers must carry an emergency set in as safe a place as is possible. The emergency set must be able to work for six hours at least at a distance of 80 miles for first class, and 50 miles for second class steamers.

12. The apparatus must be operated by a telegraphist who possesses a certificate from the Portuguese Government, or, in urgent cases and for one trip only, from any other Government which has signed the International Convention.

13. There are two certificates :—

(*a*) 1st Class (same as International).

(*b*) 2nd Class (12 words, adjustment of apparatus, knowledge of each instrument and its work, and rules *re* handling of telegrams).

Service.—Any member of the crew able to assist the telegraphist in his work, and possessing a knowledge of the operation of the apparatus, may be an " auxiliary " operator.

14. Second class telegraphists may be employed on board where the wireless service is only for the shipping company's requirements, or on fishing vessels, or they may act as assistants in cases where there is already one first class operator. On first class steamers *two* first class telegraphists must be employed.

15. On second class steamers, one first class and one second class telegraphist should be employed; on third class vessels one second class telegraphist will suffice.

Service.—As long as land stations do not exist in the Portuguese colonies, Portuguese steamers plying there are allowed to carry one first class telegraphist and one "auxiliary."

16. Transmitting must be performed by a first or a second class telegraphist, except in urgent cases.

17. The certificates state that the telegraphist has taken an oath of secrecy with regard to the correspondence.

18. The captain has authority over the working of the station.

19. Portuguese operators are preferred.

20. Should none be obtainable, foreigners may be employed if they are in possession of the Portuguese Government's certificate.
In urgent cases where no certificated telegraphist is available, provisional certificates may be issued for one voyage.

21. Certificates are supplied by the Commission after the examination of the telegraphist.

22 and 23. Captains are also bound by an oath of secrecy.

32. All telegrams sent and received on board must be registered by the captain on forms supplied by the Government. The date and hour of the sending or reception of these telegrams must be indicated.

33. Only the telegraphists and the captain are allowed to enter the wireless cabin.

34. The wireless room and the bridge must be connected by either a speaking tube or a telephone, unless they are within easy distance of one another

RHODESIA (SOUTHERN)

A—Electric Telegraph Amendment Ordinance, 1904.

B—Postal Notice No. 55 of 1912.

A THE term "electric telegraph" whenever used in the "Electric Telegraph Act, 1861," or any law amending the same or relating to "electric telegraphs," shall be interpreted as including any system or means of conveying signs, signals, or communications by electricity, magnetism, electro-magnetism, or other like agency, and whether with or without the aid of wires, and including the system commonly known as wireless telegraphy, or aetheric signalling, and any improvements or developments of such system; and the term "line of electric telegraph" shall be interpreted as including any apparatus, instrument, mast, standard, wire, substance, matter, or thing whatever, which is, or may be, used for the purpose of sending, transmitting, conveying, or receiving such signs, signals, or communications.

2. The meaning of the term "person" shall be further extended so as to include individuals, partnerships, companies, and corporations.

3. The provision of the first section of the said Act as to its application to Southern Rhodesia shall be read and construed as including the territorial waters thereof.

4. Within Southern Rhodesia, or the territorial waters thereof, no person not thereto expressly authorised by some law shall erect or make use of any mast, standard, or apparatus of any kind, for the purpose of signalling without wires by means of electricity, magnetism, electro-magnetism, or other like agency, or shall erect or construct any line of electric telegraph, except under a licence to be granted by the Administrator.

5. The Administrator may authorise the issue of a licence for the establishment or use of any apparatus or installation for the transmission of signs, signals, or communications, by electric telegraph, with or without the aid of wires, and may revoke the same at any time, and there shall be payable annually in respect of such a licence, such sum not exceeding One Hundred Pounds sterling, as may be fixed by regulation.

6. The terms and conditions of such licence, and the duration thereof, shall be subject to such regulations as may from time to time be made by the Administrator.

7. Any person who shall establish or use, or attempt to establish or use, any such apparatus or installation as is mentioned in Sections 1 and 4 of this Ordinance, in contravention of the provisions thereof, or of any other law relating to electric telegraphs, or of any regulation thereunder, shall be liable upon conviction to forfeit all apparatus so used, and to a penalty not exceeding Two Hundred and Fifty Pounds, and, in default of payment, to imprisonment, with or without hard labour, for a period not exceeding three months, and, in case of a second or subsequent conviction, in addition to such forfeiture to a penalty not exceeding Five Hundred Pounds, or in default of payment to imprisonment, with or without hard labour, for a period not exceeding six months.

8. Any Magistrate or Justice of the Peace before whom information shall be given on oath by credible persons, that the provisions of this Ordinance are being, or have been, or are likely to be infringed, may issue a search warrant, and authorise the seizure of any instruments, apparatus or appurtenances reasonably suspected to be intended for use in such contravention.

9. Notwithstanding the provisions of Section 4 of "The Electric Telegraph Act, 1861," all regulations made under the authority of that Act shall be published in the *Gazette*, and be subject, *mutatis mutandis*, to the provisions of Section 7 of Act No. 5 of 1883 of the Cape of Good Hope.

10. This Ordinance may be cited as the "Electric Telegraph Amendment Ordinance, 1904," and shall be read as one with "The Electric Telegraph Act, 1861," of the Cape of Good Hope, and the "Telegraph Protection Ordinance, 1901," and the said laws may be cited together as the "Electric Telegraph Laws, 1861 to 1904."

POSTAL NOTICE NO. 55 OF 1912.

B PUBLIC attention is hereby directed to the provisions of the "Electric Telegraph Amendment Ordinance, 1904," under which no person not thereto expressly authorised by some law shall erect or make use of any mast, standard or apparatus of any kind

for the purpose of signalling without wires by means of electricity, magnetism, electro-magnetism or other like agency, or shall construct any line of electric telegraph except under a licence to be granted by the Administrator.

The term "Line of Electric Telegraph" is defined as any apparatus, instrument, mast, standard, wire, substance, matter or thing whatever which is or may be used for the purpose of sending, transmitting, conveying or receiving signs, signals or communications.

All persons having, or desiring to have, such lines of electric communication, including telephone lines, whether on their private property or otherwise, are hereby notified that application for licence to use such lines must be made to the Administrator through the Postmaster-General.

The licence fees payable in respect of such lines, as published in Government Notice No. 391 of 1912 are as follow:—

(*a*) 1s. per annum for a private telephone or telegraph line exclusively on the private property of the person constructing and using the same;

(*b*) 10s. per annum for a private telephone or telegraph line passing beyond the boundaries of the owner's land. (The licence does not confer any right to erect telephone or telegraph lines outside the boundaries of the applicant's land, and the applicant must make his own arrangements in this regard);

(*c*) £50 per annum for any installation of wireless telegraphy or telephony.

All persons having in use lines of electric communication which have not been authorised by the Administrator are hereby notified that unless the required permission be applied for within one month of the date of publication of this Notice they will render themselves liable to the penalties provided in section 7 of the Telegraph Ordinance above referred to.

RUSSIA

A—Statute.

B—Regulations.

C—Decree of 20th February, 1908.

THE following Statute and regulations have been adopted for the institution of an inter-departmental Radiotelegraphic Committee:—

Statute.

A

1. To establish the attached regulations concerning an inter-departmental Radiotelegraphic Committee and the necessary personnel.

2. To make Paragraph 1 effective as from July 1st, 1912.

3. To allot for the expenses of the said Committee (13,200 roubles annually) from the Imperial Treasury commencing from the year 1913 and to debit the expenses for 1912 (amounting to 6,600 roubles) to the anticipated surplus on the estimates for 1912.

GENERAL VIEW OF WIRELESS LINK BETWEEN U.S.A. AND JAPAN, IN HAWAII.

PANORAMIC VIEW OF THE KAHUKU (RECEIVING) STATION, SHOWING THE GROUPING OF SOME OF THE MASTS WHICH CARRY THE AERIALS.

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REGULATIONS.

B

1. An inter-departmental Committee is instituted for the co-ordination of the work of the various departments relating to the existence and use of the Imperial network of radiotelegraphic and radiotelephonic stations and for tne consideration of schemes for the establishment and maintenance of radiotelegraphic and radiotelephonic communication which require preliminary discussion between the departments affected thereby.

This Committee is attached to the Headquarters Staff of the Postal Telegraph Department.

2. The Committee shall consist of a President and of permanent members appointed by the Ministries of the Interior, of War, of Marine, of Commerce and Industries, of Routes of Communication and of Foreign Affairs. When schemes for the establishment and exploitation of radiotelegraphic and radiotelephonic stations for the use of the Ministry of Finance or other departments are under consideration representatives of the department in question shall be appointed to attend the meetings of the Committee and have the right to vote.

When legal aspects of radiotelegraphic and radiotelephonic communication are under discussion a representative of the Ministry of Justice shall be invited to attend and shall have the right to vote.

3. The Ministers of the Interior, of War, of Marine, of Routes of Communication and of Commerce and Industries shall each appoint two members to the Committee and the Ministry of Foreign Affairs shall appoint one member.

When necessary the Ministry of the Imperial Court shall appoint two representatives to attend the meetings of the Committee and the Ministry of Justice or other Ministries shall each appoint one member.

In the event of the representative of any of the Ministries being unable to attend the meetings of the Committee the Ministry in question may appoint a temporary substitute.

4. The President of the Committee and one of the permanent members of each department that furnishes two members must have special scientific and technical knowledge, and any temporary substitute appointed to represent these must be in possession of the same qualifications.

The President of the Committee shall be appointed by His Imperial Majesty on the recommendation of the aforesaid Ministers and the members of the Committee.

The members of the Committee can be appointed without any regard as to their rank.

During the absence of the President the fulfilment of his duties shall devolve upon one of the members appointed by the Ministry of the Interior.

5. The duties of the Committee are as follows:—

(*a*) The examination of schemes which have been worked out by the various departments for radiotelegraphic and radiotelephonic installations with the object of co-ordinating them and of fitting them into a general plan for a network of radiotelegraphic and radiotelephonic stations throughout Russia.

(*b*) The regulation of the mutual relations between the radiotelegraphic and radiotelephonic stations of different departments during their operations.

(*c*) The examination of matter relating to communication between ship and shore stations.

(*d*) The consideration of proposals made by various departments for the issue of new laws, rules and regulations concerning radiotelegraphic and radiotelephonic communication.

(*e*) The preparation of materials and questions to be brought forward by Russia for discussion at International Radiotelegraphic and Radiotelephonic Conferences.

(*f*) The drafting of general technical regulations, rules and standards relating to radiotelegraphic and radiotelephonic installations.

(*g*) The investigation of the general requirements of Russia in the matter of specialists in radiotelegraphy and telephony, and in the matter of their education and of the right to radiotelegraphic and radiotelephonic communication.

(*h*) Action as consultants in connection with questions concerning radiotelegraphic and radiotelephonic communications which may be referred to the Committee by various departments and particularly the examination of and reporting upon the practical value of new inventions relating to radiotelegraphy and radiotelephony.

(*i*) All other matters and questions concerning radiotelegraphic and radiotelephonic communication.

6. All matters and questions relating to radiotelegraphic and radiotelephonic communication enumerated in Sections *a* to *e* and *h* of the preceding paragraph (5) shall be brought forward by the various departments for the decision of the Committee.

Matters indicated in Sections *f*, *g* and *i* of the same paragraph shall be examined by the Committee either on their own initiative or at the request of the departments interested.

7. Matters shall be submitted to the Committee in accordance with the instructions and resolutions of Ministers or Commanders-in-Chief in a complete form and with a definitely worded request from the department.

8. Communications between the President of the Committee and the Senate or the Chiefs of Headquarters or Chiefs of departments or their subordinates or Governors shall be made in accordance with Clauses 233-236 of the Institution of Ministries.

9. For the preliminary technical consideration of complicated affairs the Committee shall be empowered to appoint, when required, special sub-committees consisting of members of the Committee who are particularly concerned in the matter and of well-informed persons who may be invited by the Committee and who will have the right to vote at the meeting of the sub-committees. At such meeting a member chosen by the Committee will preside.

10. For the carrying out of scientific and technical researches the Committee shall be permitted to use the laboratories of the Chamber

of Weights and Measures and of other institutions in St. Petersburg, under conditions to be defined by special agreement between the Ministry of the Interior and other Ministries.

11. The final preparation and presentation of affairs to the Committee will be performed by one of the permanent members. Matters of a departmental character will be presented by a representative of the Ministry responsible for bringing the matter before the Committee for consideration.

12. The Committee will meet, by order of the President, at the Headquarters of the Postal Telegraph Department, not less than once per month, with the exception of the summer holiday season, when meetings will be convened as required.

13. To form a quorum at meetings, the attendance is required of the representatives of the department which has introduced the business under discussion, and of at least one permanent member each from the Ministries of the Interior, of War, of Marine and of Commerce and Industries.

14. All affairs in the Committee shall be decided by a simple majority of votes, each department having only one vote through its representatives. At meetings of sub-committees questions shall be decided by a simple majority of votes of all members of the sub-committee, including experts who may have been invited to attend the meetings.

In case of the votes of two parties being equal, the President shall give the casting vote.

15. In case of a department disagreeing with a decision of the Committee, the latter may, if they consider it necessary, refer the matter to the Council of Ministers.

16. In connection with each matter examined by the Committee a short protocol must be prepared and signed at the same meeting by all members of the Committee who are present. Independently of the protocols detailed journals of the meetings will be kept and these will include the opinions of the Committee concerning the business under consideration. In case of a division of votes the protocol and the journal must contain the opinions both of the majority and the minority, together with a statement as to the Ministries which were included in each party.

17. The originals of journals and protocols will be kept with the documents of the Committee, but copies of the journals must be communicated within seven days to the Chiefs of Headquarters and to Chiefs of sections of those departments which are represented on the Committee.

18. The procedure to be followed in bringing matters before the Committee must be decided by the Committee and confirmed by the Minister of the Interior by agreement with other Ministers concerned.

19. The secretarial work in connection with the Committees shall be carried out by the secretary of the Committee, by his assistant, and by the officials allotted for the clerical work of the Committee.

20. The Secretary of the Committee shall be chosen by its President, whose choice must be confirmed by the Minister of the Interior. The appointment of the assistant secretary is confirmed by the President of the Committee. Only persons who have received a University education and who have a technical knowledge of radiotelegraphy and radiotelephony will be qualified to hold such posts.

C The following are the principal provisions of the Decree concerning wireless telegraphy in Russia of February 20th, 1908:—

By a "radiotelegraphic station" is understood every installation designated for telegraphic communications and capable of producing on the spot or receiving from a distance electro-magnetic waves.

Stations of this kind comprise:—

1. Stations designated for a special use.
2. Stations designated for a general use, that is to say, open to accept telegrams from the public.

The form of administration, working, and supervision of radiotelegraphic stations are regulated by the personnel of the Telegraph Service, except in the case of the special and supplementary provisions to be eventually fixed.

The establishment of radiotelegraphic stations for public use and the general management of the Radiotelegraphic Service of the Empire are under the jurisdiction of the General Direction of Posts and Telegraphs. The various Government departments, having established radiotelegraphic stations for their special use, inform the General Direction of Posts and Telegraphs before opening the service at the named stations of their destination, power, range, and technical construction.

The carrying out by scientific associations and schools of public instruction of scientific experiments and researches in radiotelegraphy is subject to an authorisation, by special request, of the Minister for the Interior. These experiments, as well as the working of radiotelegraphic stations for purposes of instruction, can be interdicted in cases where such experiments and instructions would exercise a harmful influence on neighbouring radiotelegraphic stations, or, in general, prejudice the interests of others.

Stations on board ships anchored in ports, or sailing near the coasts, are subjected to special regulations decreed by the Minister for the Interior in common accord with the Ministers of War, of the Marine, of Ways and Communications, of Foreign Affairs and of Commerce and Industry.

SAINT HELENA

A—Wireless Telegraphy Ordinance, 1912.
B—Regulations.

A THE following Ordinance provides for the regulation of wireless telegraphy:—

1. From and after the passing of this Ordinance the Governor-in-Council may make regulations as he may deem requisite for regulating the use of wireless telegraphy on merchant ships whether British or foreign while in the territorial waters of this Colony.

2. The Master of any ship and any person who shall act in contravention of any regulation now published or which may hereafter be published shall be liable on conviction to a penalty not exceeding ten pounds.

3. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1912."

REGULATIONS.

B Made by the Governor-in-Council under Ordinance No. 7 of 1912, entitled "An Ordinance to provide for the Regulation of Wireless Telegraphy."

(1) All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of this Colony shall be worked in such a way as not to interfere with (*a*) naval signalling or (*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

(2) No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of this Colony except with the special or general permission of the Governor.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases as may be deemed desirable.

(4) These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

SAINT LUCIA

A—Wireless Telegraphy Ordinance, 1912.

B—Regulations of November 25th, 1911.

C—Regulations of August 24th, 1914.

WIRELESS TELEGRAPHY ORDINANCE.

No. 10 of 1912.

A THIS Ordinance may be cited as the Wireless Telegraphy Ordinance, 1912.

2. In this Ordinance "wireless telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall

prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (*a*) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(*b*) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

5. (*a*) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication in the *Gazette* have the same effect as if enacted in this Ordinance.

(*b*) The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(*c*) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any police officer or any person appointed in that behalf by the Chief of Police and named in the warrant, and a warrant so granted shall authorise the police officer or person named therein to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (*a*) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(*b*) Proceedings shall be taken before the First District Court on the complaint of the Chief of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraph Ordinance, 1903, is hereby repealed.

SCHEDULE—SECTION 5 (2).

REGULATIONS PASSED NOVEMBER 25TH, 1912.

B ALL apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(*a*) Naval signalling, or

(*b*) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof; and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations "naval signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and naval stations, or between a ship of His Majesty's Navy or a naval station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in charge or command of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

REGULATIONS PASSED 24TH OF AUGUST, 1914.

C Whereas by Section 5 (3) of the Wireless Telegraphy Ordinance, 1912, it is enacted that if at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time; and such regulations may

prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

And whereas, in my opinion, such emergency as aforesaid has arisen:

Now I (the Acting Administrator) do hereby make the following further Regulations, namely:—

1. The Governor may appoint any person to take possession and control of the apparatus for wireless telegraphy on board of any merchant ship while in the territorial waters of the Colony.

2. Any person so appointed may enter upon any such ship and take possession of the aforesaid apparatus thereon on behalf of His Majesty, and use the same for His Majesty's Service, and subject thereto for such ordinary services as to the said person may seem fit.

3. Any such person may instead of taking possession of such apparatus as aforesaid direct the master of the ship to submit or cause to be submitted to him all messages intended for transmission or arriving by the said apparatus or any class or classes of such messages, to stop or delay the transmission of any messages or deliver the same to him, and generally to obey all such directions with reference to the transmission of messages as such person may prescribe, and the master of the ship shall obey and conform to all such directions. Any master failing to obey and conform to any such direction shall be liable on summary conviction to the penalties provided under the Ordinance.

SAINT VINCENT

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations.

A THIS Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or install or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions, and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Colony otherwise than in accordance with regulations under this Ordinance.

5. (1) The Governor in Council may from time to time make regulations for carrying into effect the purposes of this Ordinance, and

such regulations shall on publication in the Gazette have the same effect as if enacted in this Ordinance.

(2) The Regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance, or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the Chief of Police and named in the warrant, and a warrant so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place, or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before the Police Magistrate of the First District on the complaint of the Chief of Police or of any person thereto authorised by him in writing, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. "The Wireless Telegraph Ordinance, 1904," and "The Wireless Telegraph Amendment Ordinance, 1912," are hereby repealed.

Regulations.

B

1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to intefere with—

(*a*) Naval signalling, or

(*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these Regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These Regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. Regulations made by the Governor in Council on the 17th day of December, 1912, under the authority of the Wireless Telegraph Ordinances, 1904 and 1912, are hereby repealed.

SEYCHELLES ISLANDS

NO telegraphic or electrical station, apparatus, machinery, or implements whatsoever, whether for the purpose of electrical communications by what is generally known as "wireless telegraphy," or for any other purpose connected with the transmission, emission, or reception of messages between the Seychelles Islands and any place within or outside the Seychelles Islands, shall be erected or used in any place in the Seychelles Islands, whether on private property or not, without the sanction of the Administrator previously obtained.

(2) The Administrator may refuse such sanction or grant it under such conditions or restrictions as he may think fit.

(3) The word "place" in sub-section (1) shall include any ship or floating conveyance within or without the Seychelles waters, except vessels of His Majesty's Navy.

2. Any person contravening any of the provisions of this Ordinance shall be guilty of an offence and shall be liable, on prosecution before the Court of Seychelles, to a fine not exceeding 5,000 rupees (Rd. 5,000), and every apparatus, machinery, or implement used in, or connected with, the commission of the offence shall be forfeited.

3. The Court may further order, on the application of the Crown Prosecutor, or of any person authorised by the Administrator to that effect, the immediate destruction, pulling down, or removal of any building, apparatus, machinery, or implements used in the commission of the offence.

4. All prosecutions against this Ordinance shall be instituted at the instance of the Crown Prosecutor or Inspector of Police or any person authorised by the Administrator to that effect.

5. This Ordinance may be cited as "The Telegraphic and Electrical Stations Ordinance, 1903."

SIAM.

Radio-Telegraph Law.

THIS Law may be cited as "The Radio-Telegraph Law, B.E. 2457." *(1914.)*

2. It shall come into force from the date of its publication in the Government Gazette.

Coast and Land Stations.

3. The right to establish and work radio-stations for telegraphic and telephonic purposes on Siamese soil and on board ships permanently anchored in Siamese territorial waters is an exclusive privilege of the Government.

This privilege shall be reserved to the Department of Posts and Telegraphs in the Ministry of Communications.

4. The Army and Navy may establish and work independently radio-telegraph stations or field apparatus subject to such conditions as may be from time to time sanctioned in writing by the Minister of War or Marine.

Any station established under this section may be opened to public correspondence only under special arrangement with the Department of Posts and Telegraphs.

Ship Stations.

5. No merchant ship under the Siamese flag shall establish or work any radio-telegraph or telephone apparatus without a licence from the Minister of Communications.

The Minister of Communications shall not grant such licence until he has been satisfied that the apparatus can work in accordance with the provisions of the International Radio-Telegraph Convention of London, 5th July, 1912, and will be handled by qualified operators.

Such licence shall be for such time and subject to such conditions as the Minister of Communications may deem good.

6. No ship, whether under the Siamese or a foreign flag, excepting ships of war, is allowed while in Siamese territorial waters to send a message by means of her radio-telegraph apparatus when and where such message can be forwarded by the Government system, either with or without wires, except for the purpose of transmitting messages to or from a ship in distress.

Secrecy.

7. No person or persons engaged in or having knowledge of the operation of any radio-station shall disclose the contents of any message transmitted or received by such station for the purpose of transmission, except to the person to whom the same may be directed or his authorised agent, or to another station employed to forward such

message to its destination, or in obedience to the directions of a Court of competent jurisdiction.

Penalties.

8. Whoever establishes or works any apparatus contrary to the provision of Section 3 and 6, or in excess of the conditions laid down under Section 4 of this Law, shall be punished with imprisonment not exceeding six months or fine not exceeding five hundred ticals or both.

The captain or master of a ship, and the person directly responsible for the offence, if any, shall both be liable to punishment for every infringement of the provisions of Section 6.

9. Any person infringing Section 5 of this law shall be punished with fine not exceeding one hundred ticals.

10. Upon the conviction of any person of an offence under the foregoing sections, the Court may order the forfeiture of any apparatus used for the commission of such offence.

11. Any person injuring apparatus or committing any act of mischief to a radio-telegraph station lawfully established, or doing anything to prevent or intended to prevent the transmission or delivery of any radio-telegraph message by any such station, shall be guilty of an offence under Section 196 of the Penal Code.

12. Whoever commits any offence against Section 7 of this Law shall be punished under Section 279 to 281 of the Penal Code.

Execution.

13. The Minister of Communications shall have charge and control of the execution of this Law.

It shall be lawful for him to frame regulations and to fix the scale of fees for land, coast, and ship charges in the transmission of messages by radio-telegraphy or telephony, as well as for licences under Section 5.

It shall also be lawful for him to frame regulations about the qualifications required from operators.

All such regulations shall be in accordance with the detailed Service Regulations appended to the International Radio-Telegraph Convention.

Such regulations, on being sanctioned by His Majesty and published in the Government Gazette, shall be deemed to be part of this Law.

Given on the 24th day of April, B.E. 2,457 *(1914)*, being the 1,261st day of the Present Reign.

SIERRA LEONE

A—Ordinance 11 of 1913.

B—Schedule.

THE Sierra Leone Wireless Laws and Regulations were first formulated in the Decree of 1903 and the Schedule founded thereon. In 1912 this Decree and the Regulations in the Schedule were amended by Ordinance No. 19 with the Schedule which was thereto attached. In the following year (1913) these were in their turn replaced by Ordinance No. 11 with its accompanying Schedule, both of which we print below.

AN ORDINANCE TO PROVIDE FOR THE REGULATION OF WIRELESS TELEGRAPHY.

No. 11 of 1913.

A BE IT ENACTED by the Governor of the Colony of Sierra Leone, with the advice and consent of the Legislative Council thereof as follows:—

1. *Short Title.*—This Ordinance may be cited as the Wireless Telegraphy Ordinance, 1913.

2. *Definition of "Wireless Telegraphy."*—In this Ordinance, "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which the messages or other communications are sent or received: Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. *Licence for Wireless Telegraphy.*—(1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the colony, except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. *Apparatus aboard ships to be worked in accordance with regulations.*—A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or Foreign, while that ship is in the territorial waters of the Colony, otherwise than in accordance with regulations under this Ordinance.

5. *Regulations.*—(1) The Governor may from time to time make regulations for carrying into effect the purposes of this Ordinance.

(2) *Schedule.*—The regulations in the Schedule to this Ordinance shall have effect except in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the colony shall be subject to such further regulations as may be made by the Governor from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. *Search Warrant.*—If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance or of any licence granted under this Ordinance, he may grant a search warrant to any superior Officer of Police named

in the warrant, and a warrant so granted shall authorise the Officer to enter and inspect the station, place, or ship, and to seize any apparatus which appears to be used or intended to be used for wireless telegraphy therein.

7. *Penalties.*—Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding fifty pounds, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

8. *Repeal No.* 22 *of* 1903, *No.* 19 *of* 1912.—The Wireless Telegraphy Ordinance, 1903, and the Wireless Telegraphy Amendment Ordinance, 1912, are hereby repealed.

SCHEDULE—SECTION 5 (2).

Regulations.

1. All apparatus for Wireless Telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with

(*a*) Naval Signalling, or

(*b*) the working of any wireless telegraph station lawfully established, installed or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. In these Regulations, "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Naval Stations or between a ship of H.M. Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

3. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Colony except with the special or general permission of the Governor.

4. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

5. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

6. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

Passed in the Legislative Council this Twenty-third day of May in the year of our Lord, One thousand nine hundred and thirteen.

SOMALILAND PROTECTORATE

A—Wireless Telegraphy Ordinance, 1913.

B—Regulations.

A 1. THIS Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1913."

2. In this Ordinance "Wireless Telegraphy" means any system of communication by telegraph without the aid of any wire connecting the points from and at which messages or other communications are sent or received. Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. (1) A person shall not establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place or on board any ship registered in the Protectorate, except under and in accordance with a licence granted in that behalf by the Commissioner.

(2) Every such licence shall be in such form and for such period as the Commissioner may determine, and shall contain the terms, conditions and restrictions on and subject to which it is granted.

4. A person shall not work any apparatus for wireless telegraphy installed on any merchant ship, whether British or foreign, while that ship is in the territorial waters of the Protectorate, otherwise than in accordance with regulations under this Ordinance.

5. (1) The Commissioner may from time to time make regulations for carrying into effect the purposes of this Ordinance, and such regulations shall on publication have the same effect as if enacted in this Ordinance.

(2) The regulations in the Schedule to this Ordinance shall have effect in so far as they may be amended or rescinded by regulations made under the authority of this section.

(3) If at any time, in the opinion of the Commissioner, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships while in the territorial waters of the Protectorate shall be subject to such further regulations as may be made by the Commissioner from time to time, and such regulations may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

6. If a Magistrate is satisfied by information on oath that there is reasonable ground for suspecting that a wireless telegraph station has been established without a licence in that behalf, or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any merchant ship without a licence in that behalf or contrary to the provisions of any regulations made under this Ordinance, or of any licence granted under this Ordinance, he may grant a search warrant to any Police Officer or any person appointed in that behalf by the District Commissioner and named in the warrant, and a warrant

so granted shall authorise the Police Officer or person named therein to enter and inspect the station, place or ship, and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

7. (1) Any person who shall offend against any provision of this Ordinance or any of the regulations made thereunder shall be liable on summary conviction for every such offence to a fine not exceeding rupees seven hundred and fifty, and upon such conviction the Court may order that any apparatus for wireless telegraphy in connection with which the offence was committed shall be seized and forfeited.

(2) Proceedings shall be taken before the District Court, and the procedure shall be the same as the procedure for the time being in force in respect of offences punishable on summary conviction.

8. The Wireless Telegraphs Ordinance, 1908, is hereby repealed.

SCHEDULE.—Section 5 (2).

Regulations.

i. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Protectorate shall be worked in such a way as not to interfere with—

(*a*) Naval Signalling, or

(*b*) The working of any wireless telegraph station lawfully established, installed or worked in the Protectorate or the territorial waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless stations established on ships at sea.

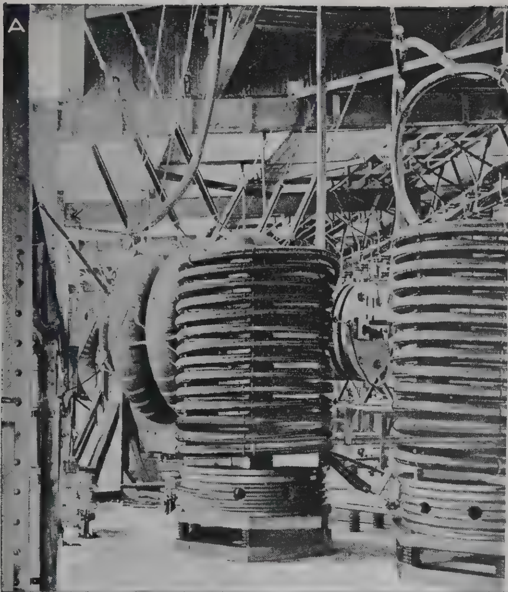
ii. In these Regulations "Naval Signalling" means signalling by means of any system of wireless telegraphy between two or more ships of His Majesty's Navy, between ships of His Majesty's Navy and Naval Stations, or between a ship of His Majesty's Navy or a Naval Station and any other wireless telegraph station whether on shore or on any ship.

iii. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used while such ship is in any harbour or bay of the Protectorate, except with the special or general permission of the Commissioner.

iv. For the purpose of any proceedings under these regulations the master or person being or appearing to be in command or charge of any ship shall be deemed to have authorised and to be responsible for the use or working of any apparatus on board such ship.

v. Any summons or other document in any proceedings under these regulations shall be deemed to have been duly served on the person to whom the same is addressed by being left on board the ship on which the offence is charged to have been committed with the person being or appearing to be in command or charge of the ship.

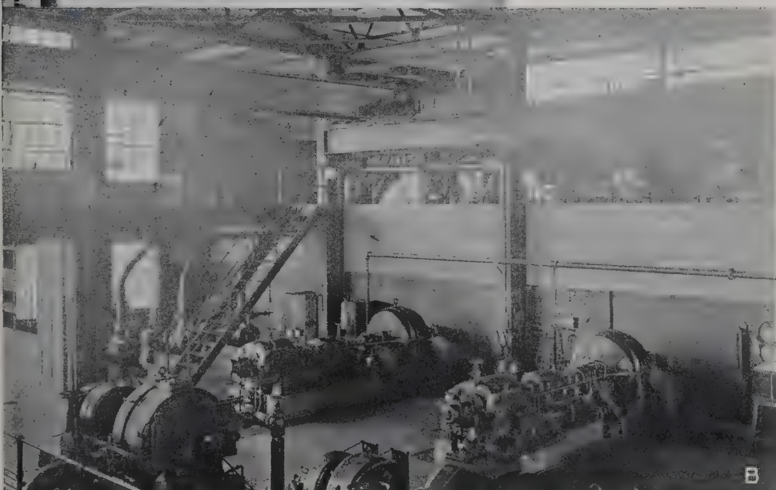
vi. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.



INSTALLATION AT
KAHUKU, HAWAII:
INTERIOR VIEWS.

A. HIGH-FREQUENCY INDUCTANCES.

B. MACHINERY FLOOR OF POWER HOUSE SHOWING TURBO-ALTERNATORS.



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SOUTH AFRICA (UNION OF)

WIRELESS Telegraphy in the Union of South Africa is under the control of the Postmaster-General.

Chapter V., Section 1, of the "Post Office Administration and Shipping Combination Discouragement Act, 1911," relates to the conditions under which telegraphs and wireless telegraphs may be worked :—

In this Act, unless inconsistent with the context—

> "telegraph" shall include "telephone," and shall mean any system or means of conveying signs, signals, sounds, or communications, by the agency of electricity, magnetism, electro-magnetism, or by any agency of a like nature, whether with or without the aid of wires, and shall include the system commonly known as wireless telegraphy, or ætheric signalling, and any improvements or developments of that system.
>
> "Telegraph line" shall include any apparatus, instrument, pole, mast, standard, wire, pipe, tunnel, pneumatic or other tube, thing, or means whatever, which is or may be used in connection with or for the purpose of sending, transmitting, conveying, or receiving telegraphic signs, signals, sounds, or communications.

1. The Postmaster-General shall have the exclusive privilege of constructing and maintaining telegraph lines and of transmitting telegrams or other communications by telegraph within the Union or the territorial waters thereof, and of performing all the incidental services of receiving, collecting, or delivering telegrams or other such communications: Provided that—

(*a*) the owners of any system of railways may maintain and work for the purposes of any such railway, for the time and to the extent authorised by any law, any telegraph lines constructed in pursuance of rights conferred by that law; and

(*b*) the Postmaster-General may construct, maintain, or lease telegraph lines for private use or may, by licence, authorise any person to construct, maintain, and work private telegraph lines within the Union or its territorial waters and may prescribe the fees and conditions therefor.

SPAIN

A—Law of 26th October, 1907.

B—General Rules, 24th January, 1908.

C—Regulations, 24th January, 1908.

D—Royal Order of September 4th, 1914.

AS early as 1899 commissions were appointed in Spain which, from time to time, issued reports to their Government on the subject of Wireless Telegraphy. As a result a Royal Decree of May 21st, 1905, appointed a permanent commission, presided over by the Chief of the General Staff and including representatives of the War Office, Admiralty and Home Office, thus anticipating the first International Conference

concerning Wireless Telegraphy—*i.e.*, that held in Berlin, 1906 (subsequently modified by the London International Convention of 1912).

Spain is one of the signatories of the important "Safety of Life at Sea" Convention and has become a party to all the international agreements affecting Radiotelegraphy. She has, moreover, passed separate laws and regulations framed with the object of establishing and developing this applied science in the home country and in her dependencies.

LAW OF OCTOBER 26TH, 1907.

THE GOVERNMENT OF SPAIN IS HEREBY AUTHORISED TO ESTABLISH AND DEVELOP THE WIRELESS, CABLE AND TELEPHONE SERVICES.

A H.M. Don Alfonso XIII. by the grace of God and by the Constitution, makes it known by these presents that Parliament has decreed and he, the King, has given his Royal assent to the following :—

ART. 1.—The Government is hereby authorised to establish and develop the wireless, cable and telephone services—availing itself of the co-operation of national institutions—by means of a Royal Order which will be published within four months from the promulgation of this law.

ART. 2.—The expenses entailed by each service will be covered by the takings of the concession itself. In the case of certain concessions, the proviso is reserved that the establishment may be taken over by the State in whole or part, by Royal Decree, should the so doing be considered as in the national interests.

ART. 3.—Concessions regarding these new services will be granted by public tender, and all necessary conditions must be fulfilled in order to safeguard the interests and security of the nation.

It is therefore decreed :

That all tribunals, magistrates, prefects, governors and all persons in authority, whether civil, military or ecclesiastical, whatever their rank and dignity, must obey and see to it that this law is observed in all its parts.

Given at the Royal Palace on October 26th, 1907.

GENERAL RULES.

PROMULGATED BY ROYAL DECREE AS THE BASIS FOR THE ESTABLISHING OF WIRELESS SERVICE IN SPAIN.

B ART. 1.—The establishing and exploitation of all systems and apparatus available for the so-called "Hertzian telegraphy," "etherial telegraphy," and "radiotelegraphy," and all similar processes already invented or which may be invented in the future, shall be considered as included among the State monopolies regarding all means of electrical communications.

ART. 2.—The establishing and exploitation of the above telegraphic systems shall be controlled by (1) the Minister of the Interior in all matters appertaining to the general civil applications of the said systems, and (2) by the Ministers of War and Marine when and where those applications are specially connected with national defence and with the army and navy.

Art. 3.—All other official departments requiring a radiotelegraphic service can erect wireless installations by previous agreement with the Minister of the Interior. Such installations will be under the regulations established for the regular wireless service and wireless experiments.

Art. 4.—No experiments with the above-mentioned systems can be instituted in the Peninsula, or in the Balearic and Canary Islands, or in Spain's African possessions, without the authority of the Ministers of War, Marine or Interior, according to the kind of experiment which it may be proposed to carry out. Such experiments and trials shall be carried out under the official inspection of the respective departments responsible, excepting only those of a techincal character carried out by the personnel of the scientific institutions of the State. These shall be independent of the said departments, providing they adhere to the regulations laid down.

Art. 5.—The Minister on whose authority the above installations and experiments are established and effected must give notice thereof to the other Ministers, giving them also full particulars regarding their service and conditions.

Art. 6.—Acting in agreement with the Ministers of War and Marine, in the cases herein aforesaid, and acting independently in all other cases, the Minister of the Interior can authorise the installation of wireless stations, provided that none have been officially installed, when the said installations may have been applied for by individuals, societies, corporations or national institutions, subject to the following rules :—

(1) The applicant shall address himself in the first instance to the Minister of the Interior, stating clearly the place where the installation is to be erected, and supplying a plan of the building, together with the conditions and advantages of the locality.

(2) Such installations and the services they are expected to render shall be subject to the special rules and conditions laid down in each case, and to the general regulations established by the State for its own installations and wireless service.

(3) The Government shall have the right to close the service under extraordinary circumstances affecting the safety of the State and the maintenance of public order.

(4) The Government shall also have the right to acquire by purchase, whenever it may be considered convenient, and with the previous payment of an indemnity, the wireless installations hereinbefore mentioned, and the valuation for such compensation shall take into consideration the actual condition of the material and of the installation itself.

(5) The concessionnaire shall let the Minister of the Interior know, in good time, the date on which the station or stations will start working, in order to allow the personnel of the telegraph office the necessary time for their inspection.

(6) The petitioner must not consider himself entitled to proceed with the work of installation until the necessary authorisation has been granted.

The following rules were added by Decree of July 19th, 1914.

(7) If the stations are to be fitted up merely for the reception of messages and for scientific purposes, or to serve as auxiliaries to meteorological observatories, authorisation for the same can be obtained from the Minister of the Interior, provided that the application be made by an Official Institution, or by a private individual acting with the support of an Official Department.

(8) These receiving stations must be inspected by the Director of Telegraphs of the locality where they are installed.

(9) The persons appointed to carry out the reception must take an oath before the Civil Governor of the Province, to keep secret all information they may gather from the radiotelegraphic messages.

ART. 7.—The ships belonging to the national mercantile marine can instal on board wireless stations worked on any of the wireless systems in current use, provided they obtain a special permit to do so from the Minister of Marine, who will grant it in accordance with the conditions established by the International Agreement and Service Regulations adopted in Berlin on November 3rd, 1906.

ART. 8.—Permits to establish wireless installations will not be granted to any private individual, society, or corporation, belonging to a foreign nationality.

ART. 9.—Any person or persons exploiting or using clandestinely any system of wireless, or any person or persons attempting to conduct wireless experiments with apparatus available for the purpose, will be prosecuted in conformity with the penal Code, the general law, the military orders, or the administrative regulations, as the case may be. Prosecution for these offences will be carried out by the authorities entrusted with the administration of the said laws, orders and regulations; and the State will confiscate all material employed for such purposes.

ART. 10.—By agreement between the Ministers of War, Marine and Interior, the wireless stations which may be considered necessary and convenient for commerce, navigation and national defence will be erected on the sea board of the Iberian Peninsula, on the Balearic and Canary Islands, and in the African possessions of Spain.

These installations will be under the control of the aforesaid three Ministers, as the case may be, both in the matter of supplies and of personnel and offices, and they will form a part of the national telegraphic system.

This linking up of the wireless with the land telegraphic service will be effected by the ministerial department controlling the various wireless installations.

ART. 11.—Authorisation is hereby given for the interchange of messages between ships belonging to the national mercantile marine and those belonging to foreign nations carrying wireless installations of current systems, and also for the interchange of messages between the said ships and the coast stations already established or to be established by the Ministry of the Interior on the sea board of the Peninsula, on the Balearic and Canary Islands, and in the Spanish possessions in Africa.

The Minister of the Interior shall determine the date of the inauguration, the extension and the class of service of each station.

Art. 12.—The Government shall have the option of refusing or accepting those wireless systems the details of which have not been made public.

Art. 13.—The State accepts no responsibility for the wireless service. In the cases of errors or of non-delivery of radiotelegrams the procedure followed will be as established in Art. 35 of the Berlin regulations.

Art. 14.—Whatever the object of the installations, the wireless service shall be organised, whenever possible, in such way as not to disturb other services of the same kind, or class. The ministerial departments interested shall adopt in each case such rules and regulations as may be found necessary, and shall also arrange regulations with other States regarding frontier installations.

Art. 15.—All wireless services, whether public, official, or private, carried on through the intermediary of land, coast and ship stations, shall be subject to the regulations hereunto attached.

Art. 16.—In addition to the rules herein contained, and those of the regulations mentioned in the previous article, the provisions affecting Radiotelegraphy contained in the International Convention made in Berlin on November 3rd, 1906, together with the Service Regulations appended thereto, must be observed.

Art. 17.—The Director-General of Posts and Telegraphs shall see to the fulfilment of the stipulations made by Art. 13 of the International Agreement and of those made by Art. 37 of the Berlin regulations, regarding the International Bureau established in Switzerland. The Ministers of War and Marine shall in accordance thereunto furnish the data required, which must be in the possession of the naval and military installations and stations, and also data affecting the merchant ship stations, whose installations are authorised by the Minister of Marine.

Art. 18.—Messages received from or transmitted directly to a country or ship registered in a country which is not a signatory of the convention and regulations of Berlin, can only be admitted through the Spanish telegraphic system and through the coast wireless stations after a declaration has been made by the country in question expressing an intention of applying the rules laid down by the said convention, and their regulations regarding the regular routine of the messages and the security of the accounts. In their radiotelegraphic service the coast stations shall give preference to the service of those countries which have become parties to the international agreements.

Articles 19 *to* 34 *and the additional articles appended thereto deal with wireless installations on fortresses.*

REGULATIONS.

Governing the working of the Wireless Stations in Spain.

General Service.

C

Art. 1.—All persons are allowed to make use of the wireless service, but the Government reserve to themselves the privilege of suspending for an indefinite period, as they may judge convenient, either every class of communication or such communications as belong to some particular class, or communications which affect some special station or stations.

ART. 2.—The following regulations and conditions laid down for the radiotelegraphic service in Spain, besides the provisions affecting radiotelegraphy contained in the International Convention made in Berlin on November 3rd, 1906, together with the Service Regulations appended thereto, shall be applied to all wireless stations, whether public, official or private, on the coast of the Peninsula, the Balearic and Canary Islands, the African possessions of Spain, and to all ships navigating those territorial waters.

ART. 3.—Ship stations shall be free to select their system of wireless installations; but for coast stations the administration shall adopt the system and equipment judged to be the best available from the point of view of scientific, technical and economic progress.

ART. 4.—All coast wireless stations shall be linked with the general telegraphic system, by means of private lines, in order to secure rapid communications.

ART. 5.—The working of wireless stations of all classes shall be carried out in such way that, as far as possible, no disturbance may be occasioned to other stations of the same kind.

ORGANISATION OF WIRELESS STATIONS.

ART. 6.—Wireless stations of all kinds must maintain reciprocal communications with the least possible waste of power.

ART. 7.—Wireless stations in Spain shall use the international signals of the Morse Code for the transmission of messages.

ART. 8.—All wireless installations in Spain, including both coast and ship stations, open to the public, must carry on an interchange of messages irrespective of their wireless systems.

During the working hours fixed for each coast station the latter must receive the Morse signals and must also have a transmitter so disposed as to be able to reply in the signals of the same code.

ART. 9.—Coast wireless stations must accept and must give *absolute priority* to calls for help from ships in danger. They must, moreover, answer the said calls in the same order of priority and pass them on as urgent messages to the general telegraphic service.

ART. 10.—The administration shall establish three classes of stations, viz., public, official, and private. Those of the first class must have a radius of 600 kilometres and over, those of the second class one of 400 kilometres (there or thereabout), and those of the third class one of 200 kilometres. Exceptions may be made in accordance with practical experience in working.

ART. 11.—First class stations shall have three wave-lengths at their disposal, namely, one of 300 metres, another of 600 metres, and another which may reach the maximum length, but which must not be less than 1,600 metres. The last two will be used normally. The second and third class stations shall have two wave-lengths, namely, one of 300 metres and one of 600; and those of the second class will use normally the 600 metres wave-length, whilst those of the third class will use one of 300 metres, except in the cases referred to in Art. 14 final paragraph.

Coast stations situated near each other may maintain a special service between each other, provided that the distance between them

allows of their doing so; but they must give preference to the Maritime Service. In the latter case, and for communications with national vessels on official matters, coast stations of both classes are allowed to use the special wave-lengths to which their installations are adapted or adaptable for these services.

ART. 12.—Ships belonging to the Spanish Merchant Service shall use a normal wave-lengths of 300 metres, but they can alter this to a maximum of 600 metres.

Only in exceptional cases are vessels of small tonnage allowed to use *normal waves* of less than 300 metres.

ART. 13.—The General Post and Telegraph Office shall publish and keep always up to date a Directory showing the coast and ship wireless stations authorised and open to the public; together with the following information:—

(1) Name and geographical position of the coast station; identification signal in the International Code, and the port of register of the ship fitted with wireless.

(2) Call letters. (These must be all different and must be formed by groups of three letters).

(3) Normal range.

(4) Wireless system adopted.

(5) The class of receiving apparatus, whether automatic or auditive, etc.

(6) Length of waves used by the station. (The normal wave must appear in italics.)

(7) Class of service rendered by the station. This covers such items as general communication, restricted communication (*i.e.*, communication with ships, with steamship companies, with ships fitted with apparatus of the same system, etc.); public long distance communications; communications of a private nature; special communications (*e.g.*, those of an exclusively official character), etc.

(8) Hours of service.

(9) Coast and ship station rates.

The Directory above-mentioned shall also include information regarding wireless stations not open to general public service and the existence of which has been made known to the International Bureau by the Spanish Administration.

ART. 14.—Wireless service in coast stations shall be, whenever possible, of a continuous nature, operating both night and day without interruption.

The Post and Telegraph Office shall fix, in each case, the hours of service of those stations where the service is limited.

Coast stations where the service is not of a continuous nature cannot close for the day without having transmitted all radiotelegrams to ships within their sphere of action and without having first received all the radiotelegrams advised by them. This proviso shall also apply in the case of ships signalling their presence before the closing hour of the station.

ART. 15.—Private corporations cannot instal ship stations nor can they work any such station without Governmental authorisation.

Permits in these cases will be issued in accordance with the provisions of the Berlin Convention and Regulations, by the Ministry of Marine, and will be communicated by the latter to the General Post and Telegraph Office.

Ship stations duly authorised must fulfil the following conditions :—

First.—The system employed must be a tuned system.

Second.—The speed, both for the reception and transmission of messages, must not under normal circumstances be less than twelve words per minute, allowing five letters to the word.

Third.—The power transmitted to the wireless apparatus must under normal circumstances, not exceed one killowatt. Nevertheless, greater power can be used if the ship is obliged to communicate over a distance exceeding 300 kilometres from the nearest coast station; or, if by reason of any interference, no communication can be established without increasing the power.

The service at the coast and ship stations shall be attended to by operators having their qualifying certificates issued by the General Post and Telegraph Office. This certificate must state the professional knowledge of the operator in the following matters :—

(*a*) Equipment of the apparatus.

(*b*) Auricular transmission and reception at a speed of not less than twenty words per minute.

(*c*) The knowledge of the regulations regarding interchange of wireless communications.

The qualifying certificate must also state that the Government has notified the operator that it is his duty to treat all communications as confidential.

Steamship companies are allowed to employ their own qualified operators provided they fulfil the conditions hereinbefore mentioned.

The Making-Out and Presentation of Messages.

Art. 16.—For the making-out and presentation of radiotelegrams the provisions of Articles 10, 11 and 33 of the Berlin Conference Regulations, in addition to the rules laid down in the folowing articles, shall be observed.

Art. 17.—Radiogram forms must have the words Radio Service on the heading.

On the transmission of messages from ship to coast stations no mention will be made of the date and hour of deposit.

On the re-transmission to the telegraph lines the coast stations shall note their own name as that of the station of origin, followed by the name of the ship, and shall register as the hour of transmission the time at which the radio was received by them.

Art. 18.—The instructions for delivery of messages destined for ships at sea must be as complete as possible. The form must be filled up as follows :—

First.—The name of the addressee with additional indications if necessary.

Second.—The ship's name as it appears in the Directory, adding her nationality, and if necessary, as in cases where there are two or more ships of the same name, adding also her identification letters in the International Code.

Third.—The coast station name as it is given in the Directory.

ART. 19.—The following messages will not be admitted :—

(1) Reply-paid messages.

(2) Money orders.

(3) Messages to be paid on delivery.

(4) Messages demanding acknowledgement of reception.

(5) Messages to be forwarded.

(6) Messages at special rates, except those for transmission on the telegraphic section or over-land wires.

(7) Messages marked "urgent," except on the over-land wired service, and then only with the reservation that the provisions of the international telegraphic regulations must be applied.

(8) Messages to be forwarded by post or express.

ART. 20.—The messages may be written in plain language or in code in accordance with the interior regulations for ordinary service and with the international conventions on the matter.

ART. 21.—The officials at the stations can ask the senders of wireless messages to prove their identity.

RATES AND EXECUTIVE REGULATIONS.

ART. 22.—In the counting of words in order to apply the rates the officials must follow the provisions of Articles 18, 19 and 20 of the International Telegraph Service Regulations as revised in London in 1903.

ART. 23.—In conformity with Article 10 of the Berlin International Convention, the total rate for wireless messages shall include :—

1. The rate applicable to the maritime section, namely,

(*a*) the rate in force at the *coast station.*

(*b*) the rate in force at the *ship station.*

2. The rate established for the over-land wired service, national or international, calculated in accordance with the general rules.

ART. 24.—The rate applicable to the maritime section is hereby fixed at 0.75 pesetas per word, of which 0.45 belongs to the coast station and 0.30 to the ship station.

With regard to the international service, in the case of messages to and from foreign ships, these rates shall be payable in francs, on the same basis.

The rate applicable to the over-land wired service, national or international, shall be calculated and allocated in accordance with the interior regulations and with the international regulations.

The minimum rate applicable to the maritime section of wireless messages is hereby fixed at 7.50 pesetas, which is the coast station rate for a radiogram of ten words.

ART. 25.—The coast station rate will be charged only once, even if the message goes through several coast stations.

ART. 26.—The whole cost of the radiotelegram must be paid by the sender, and at ship stations a tariff indicating this must be displayed.

ART. 27.—For the purposes of book-keeping the coast station must consider itself as addressee with regard to the messages coming from

the telegraphic service on their way to ship stations; and the coast station must consider itself as the original office with regard to the messages coming from ship stations for transference to the telegraphic service.

Art. 28.—Coast and ship station rates shall be calculated in accordance with the number of words computed, and in accordance with Article 23 of these Regulations.

Art. 29.—Merchant ships at sea can interchange messages if they find it convenient. The rates to be charged in such cases shall be laid down by the respective owners and shall not be taken into account by the National Administration.

Art. 30.—Ship stations on Spanish vessels shall send to those chartering them, upon their arrival in port, all documents in connection with and referring to all messages exchanged with coast stations. The charterers shall send such documents monthly to the General Post and Telegraph Office, where it will be kept for a minimum period of twelve months and where liquidation of the accounts must be made in due course.

Art. 31.—The installations on Spanish men-of-war shall use, in their communications with the coast stations open to the public, the wave-lengths which—under the terms of the Berlin Regulations—may be agreed upon between the Minister of Marine and the Minister of the Interior for the official service.

Both Spanish and foreign men-of-war can exchange private messages with the coast stations or with merchant ships; but only for the benefit of their crews. In such cases the technical and tariff provisions of these Regulations and those of the Berlin Convention and the Berlin International Regulations for the transmission of public correspondence, must be observed, as in the case of a merchant ship station open to the public. The regulations established to prevent the disturbance of wireless communications must be most carefully adhered to.

Art. 32.—When men-of-war exchange messages (private) with coast stations or with other ship installations they must follow the rules established for the computation of words and the collection of rates. In such cases the ship's purser in the Spanish vessels and the Minister of Marine shall respectively exercise similar functions to those assigned to the administration on board, and to the owner, as far as merchant ships are concerned.

In the calculation of coast and ship station rates for private service exchanged with foreign men-of-war, the General Post and Telegraph Office shall come to an understanding with the Administration of the country to which the said men-of-war belong.

Art. 33.—The same provisions shall hold good in the case of a military wireless installation, either permanent or portable, when the said installation utilises the stations established by the Administration for Public Service.

Art. 34.—Should, by some accident, the Submarine Cable Service be substituted for the Wireless Service for the sending of a message, the former shall only receive the rate applicable to a coast station. If communication by wireless is established between two points in Spanish territory otherwise without telegraphic communication, the

rates charged shall be those of the Interior Telegraphic Service, and the rules of that service shall apply, except in the cases provided for in Article 19 of these Regulations.

Art. 35.—In the matter of transmission of messages, of the signals to be employed in them, orders of transmission, calls, acknowledgments of receipt, instructions as to the route to be followed by the radiograms, and instruction as to their final destination, the provisions made in Articles 15 to 32, both inclusive, of the Berlin Regulations must be observed.

Art. 36.—In cases when the return of charges made for radiotelegrams has been justly established, the provisions of Article 35 of the Berlin Regulations must be observed.

Book-Keeping.

In matters refering to book-keeping for the international wireless service the provisions of Article 36 of the Berlin Regulations must be observed.

General Rules.

Art. 38.—Coast stations, previously authorised by the General Post and Telegraph Office, shall furnish the authorised agents of Maritime Information Bureaux with all such particulars concerning wrecks and disasters at sea as are of any interest to navigators, always provided that the said agents apply for such information.

Art. 39.—Authorised interchange of messages between ship stations on the high seas must be carried out in such a way as not to disturb the coast station's service. The latter shall have, as a general rule, the right of priority for Public Service.

Art. 40.—The order of transmission between ship stations on the high seas shall be settled by agreement between themselves.

The re-transmission of messages between ships at sea shall be arranged by agreement between the interested parties.

Art. 41.—The provisions of the International Telegraphic Regulations shall be applied by analogy, to radiotelegraphic communication as far as they are not antagonistic to these Regulations, or to the Convention, Additional Agreement, and the International Regulations of the Berlin Conference.

Art. 42.—The provisions of Articles 5, 6, and 9 of these Regulations shall apply to all classes of wireless installations, official and authorised, even if they are not open to Public Service.

Madrid, January 24th, 1908.

Approved by His Majesty the King.—Maura.
(There is a Seal.)

ROYAL ORDER OF SEPTEMBER 4th, 1914.

D Art. 1.—According to the Royal Order of January 24th, 1908, the inspection and regulation of the Wireless Telegraph Service on board vessels of the Mercantile Marine are under the supervision of the Minister of the Navy, and by delegation to the Director-General of Fisheries and Merchant Shipping. The installations should fulfil all the requirements of the said Royal Order together

with the rules and regulations of the London Radiotelegraph Convention of June, 1913, and the rules of the Safety of Life at Sea Convention, January, 1914.

Everything affecting the service shall be controlled by the Navigation Department, which shall attend to the following matters :—

(1) The registration of all new installations authorised.

(2) The forwarding of all documents regarding such new installations accompanied by the order for their recognition.

(3) The sending of a report to the Home Office and War Office as to the result obtained from the various installations, together with indications of their characteristics.

To attend to this service the Director of Navigation and Fisheries will nominate a chief or a superintending official, together with five wireless inspectors on the coast, and this staff must have the qualifications as set forth in the Royal Order of May 21st last.

ART. 2.—The distribution of the staff on the coast and in the maritime provinces under each inspector shall be as follows :—

Barcelona :—Maritime provinces of Barcelona, Tarragona, Valencia, Mallorca and Minorca (the residence of the inspector being at Barcelona).

Cartagena :—Maritime provinces of Alicante, Cartagena, Almeria and Malaga, Melilla and Ceuta (the residence of the inspector being at Cartagena).

Cadiz :—Maritime provinces of Cadiz, Canary Islands and Huelva (the residence of the inspector being at Cadiz).

Vigo :—Maritime provinces of Vigo, Pontevedra, Villagarcia and Coruña (the residence of the inspector being at Vigo).

Bilbao :—Maritime provinces of Gijon, Santander, Bilbao and S. Sebastian (the residence of the inspector being at Bilbao).

ART. 3.—The wireless inspectors shall be under the orders of the Commandante de Marina of districts to which they are attached and in the ports of which they will have to make their annual inspection. They will only be allowed to leave their habitual place of residence when, for the convenience of the shipbuilders, they have to inspect a station in any other port in their district.

ART. 4.—The wireless inspectors must attend to the following duties :—

(*a*) To verify and inspect all new installations concerning which they may have been notified by the Director-General of Navigation and Fisheries that they are ready for public service, and to send in a report of the result of their verification and inspection.

(*b*) To visit annually the installations of such ships as are registered in the ports belonging to the districts within their jurisdiction, and to issue the necessary certificate according to the London Safety of Life at Sea Convention.

(*c*) To inspect foreign ship stations on board vessels which take passengers in Spain with the object of verifying that they are in possession of the certificate issued under the Safety of Life at Sea, which certificate must have been issued by the marine authorities of their respective countries.

(*d*) To report to the Director-General all remarks or complaints made by the shipowners, crew, or passengers in regard to this service so that the aforesaid Director may take such necessary steps as he may think fit.

(*e*) To see that all the staff who work the installations are in possession of the Government certificate according to the law of January 24th, 1908, with the object of making sure that all these installations are handled by duly qualified operators.

ART. 5.—For those duties a register book will be given to the wireless inspector in which he shall note the following particulars of each visit :—

(*a*) Date and place of inspection.

(*b*) Name of the vessel.

(*c*) System, radius, wave-lengths, etc.

(*d*) Names of operators and dates of their certificates.

A copy of this information is to be sent every quarter to the Director-General in order that he can make out a list and maintain a register devoted to all important information and data.

ART. 6.—The naval and marine authorities will do their best to facilitate the work of the inspector, putting at his disposal the *craft* and *personnel* required by him for the fulfilment of his duties.

ART. 7.—When it is desired to instal a wireless station on board a ship, the builder, the owner, the agent or the captain must ask for permission from the Director-General of Navigation and Fisheries. As soon as the installation is completed the applicant must notify the above authority, stating the port in which he desires the visit to be made, so that the wireless inspector may receive instructions accordingly.

ART. 8.—Wireless installations are sub-divided into three classes :—

(1) Stations with permanent service.

(2) Stations with limited service.

(3) Stations with special service.

Class 1 includes all vessels which carry twenty-five or more passengers and which have an average speed of fifteen or more knots. This class includes also ships carrying 200 or more passengers, having a speed of over thirteen knots, and travelling a distance of over 500 miles between two consecutive ports. The latter vessels should carry at least two telegraphists.

To Class 2 belong all the steamers not included in Class 1, provided they are fitted to carry twenty-five passengers or more. During the voyage the ships of this class must have one telegraphist on constant watch during seven hours per day and ten minutes at the beginning of the other hours.

In cases where the vessel is more than 500 miles distant from the nearest coast, the watch must be permanent.

To Class 3 belong all ships which are not included in Classes 1 and 2, and having fifty or more persons on board and carrying less than twenty-five passengers or none.

The watch service on these ships must be continuously maintained during a transatlantic voyage or when the ship is over 1,000 miles distant

from the coast. In special circumstances, and whenever advisable for the safety of life at sea, ships of every class may be obliged to keep a constant watch.

Vessels belonging to subsidised Government lines are obliged to carry wireless, no matter where they sail to or what crew they carry.

ART. 9.—The radius of the wireless station shall be a minimum of 100 miles at sea in day-time when communicating with ships under normal conditions and circumstances.

All the stations must be provided with an emergency set, installed on the upper deck, which must be kept in the best condition, having a source independent of the main electric supply and capable of being set in instant working order; this set must be able to work during six hours at least, and must possess a radius of a minimum of eighty miles for ships of the first class and fifty miles for the others.

ART. 10.—When testing the transmission and reception of messages, both installations shall be made to work with a ship at a distance of about 100 miles.

The wave-length and the oscillation current of the aerials must be measured.

When the Director-General thinks it necessary, the curves of resonance will have to be made and the degrees of coupling adjusted. When it is necessary to test the state of the receiving apparatus, the Director may order that one or several of the officers in that service shall make trial tests with the different stations at various distances during the voyage.

ART. 11.—Inspections must be made at the ports of Barcelona, Cartagena, Cadiz, Vigo and Bilbao, which are the places of residence of the wireless inspectors. However, if for the convenience of builders, the inspection should be carried out at some other port, these builders must defray the travelling expenses of the said inspector.

ART. 12.—The radio inspectors shall receive remuneration for all the inspections they carry out with regard to wireless installations.

The amount of this remuneration shall be 100 pesetas with an increase of twenty-five pesetas for each auxiliary transmitter which the ship may carry independent of the emergency installation. Such remuneration shall be the same whatever the rank held by the radio inspector.

The annual inspections held for the issue of certificates in accordance with the provisions of the London Safety of Life at Sea Convention shall be made free of charge.

(Signed) RAMON ESTRADA,
Director-General of Navigation and Marine Fisheries.

Madrid, September 4th, 1914.

STRAITS SETTLEMENTS

A—Wireless Telegraphy Ordinance, 1912.

B—Regulations.

COMMERCIAL Wireless Telegraph stations have been erected at Singapore and Penang. These stations are under the control of the Postmaster-General at Singapore.

A The following Ordinance, dated December 16th, 1912, provides for the Regulation of Wireless Telegraphy :—

1. This Ordinance may be cited as "The Wireless Telegraphy Ordinance, 1912."

2. The expression "wireless telegraphy" means any system of communication by telegraph as defined by "The Telegraph Ordinance, 1895," without the aid of any wire connecting the points from and at which the messages or other communications are sent or received :

Provided that nothing in this Ordinance shall prevent any person from making or using electrical apparatus for actuating machinery or for any purpose other than the transmission of messages.

3. The Governor may, whenever he shall deem it expedient to do so, licence the establishment of any wireless telegraph station or the installation or working of any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony.

4. (1) No person shall establish any wireless telegraph station or instal or work any apparatus for wireless telegraphy in any place in the Colony or on board any British ship registered in the Colony except under and in accordance with a licence granted in that behalf by the Governor.

(2) Every such licence shall be in such form and for such period as the Governor in Council may determine, and shall contain such terms, conditions and restrictions on and subject to which the licence is granted as the Governor shall consider desirable in the public interest.

5. (1) If any person establishes a wireless telegraph station without a licence in that behalf or instals or works any apparatus for wireless telegraphy without a licence in that behalf he shall be liable to a fine not exceeding one thousand dollars or to imprisonment of either description for a term not exceeding twelve months, and in either case be liable to forfeit any apparatus for wireless telegraphy installed or worked without a licence, but no proceedings shall be taken against any person under this Ordinance except with the previous sanction of the Public Prosecutor.

(2) If a magistrate is satisfied by information on oath that there is reasonable ground for believing that a wireless telegraph station has been established without a licence in that behalf or that any apparatus for wireless telegraphy has been installed or worked in any place or on board any ship within the jurisdiction without a licence in that behalf he may grant a search warrant to any police officer to enter and inspect the station, place or ship and to seize any apparatus which appears to him to be used or intended to be used for wireless telegraphy therein.

6. (1) The Governor in Council may make regulations for all or any of the following matters :—

(*i.*) For prescribing the form and manner in which applications for licences under this Ordinance are to be made;

(*ii.*) for prescribing the fees payable on the grant of any licence;

(*iii.*) for regulating the manner in which apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, in the waters of the Colony shall be worked so as to prevent interference with naval signalling or the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and so as not to interrupt or interfere with the transmission of any wireless messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea;

(*iv.*) for prohibiting, except with the special or general permission of the Postmaster-General of the Colony the working or using of any apparatus for wireless telegraphy on board a merchant ship, whether British or foreign, whilst such ship is in any of the harbours of the Colony;

(*v.*) for prohibiting or regulating in case at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by wireless telegraphy on board merchant ships, whether British or foreign, in the waters of the Colony the use of wireless telegraphy on board such ships while in such waters by such further rules as the Governor may see fit to make from time to time, and either in all cases or in such cases as may be deemed desirable.

(2) Provided that no regulations made in respect of the matters described in paragraphs (*iii.*) (*iv.*) and (*v.*) of this section shall apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

7. When an applicant for a licence proves to the satisfaction of the Governor that the sole object of obtaining the licence is to enable him to conduct experiments in wireless telegraphy a licence for that purpose shall be granted, subject to such special terms, conditions and restrictions as the Governor may think proper, but shall not be subject to any rent or royalty.

8. (1) Every omission or neglect to comply with and every act done or attempted to be done contrary to the provisions of this Ordinance or of any Regulation made thereunder, or in breach of the conditions and restrictions subject to or upon which any licence has been issued, shall be deemed to be an offence against this Ordinance, and for every such offence not otherwise specially provided for the offender shall, in addition to the forfeiture of any articles seized, be liable to a fine of five hundred dollars.

(2) All convictions, forfeitures and fines under this Ordinance or any Regulations made thereunder may be had and recovered before a district court.

Regulations.

B THE following Regulations, dated January 5th, 1914, were made under the "Wireless Telegraphy Ordinance, 1912":—

1. All apparatus for Wireless Telegraphy on board a merchant ship whether British or foreign in the waters of the Colony shall be

DR. J. A. FLEMING, F.R.S.

(For whose Biographical Notice see page 880.)

[*To face page* 336.

worked in such a way as not to interfere with (*a*) Naval signalling, or (*b*) the working of any Wireless Telegraph station lawfully established, installed, or worked in the Colony or the waters thereof, and in particular the said apparatus shall be so worked as not to interrupt or interfere with the transmission of any messages between Wireless Telegraph stations established as aforesaid on land and Wireless Telegraph stations established on ships at sea.

2. No apparatus for Wireless Telegraphy on board a merchant ship whether British or foreign shall be worked or used whilst such ship is in any of the harbours of the Colony except with the special or general permission of the Postmaster-General of the Colony.

3. If at any time, in the opinion of the Governor, an emergency has arisen in which it is expedient for the public service that His Majesty's Government should have control over the transmission of messages by Wireless Telegraphy, the use of Wireless Telegraphy on board merchant ships whether British or foreign while in the waters of the Colony shall be subject to such further rules as may be made by the Governor from time to time, and such rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These Regulations shall not apply to the use of Wireless Telegraphy for the purpose of making or answering signals of distress.

SUDAN

(See Egypt, page 203.)

SWEDEN

A—Act of 31st August, 1907.

B—Royal Decree of 20th June, 1913.

C—Resolution of Director-General of Telegraphs, 22nd August, 1913.

D—Extracts from Statute 131, dated 10th August, 1914, and Statute 514 of 23rd December, 1915.

THE Administration of Wireless Telegraphy in Sweden is under the control of the Royal Board of Telegraphs:—Director-General of Telegraphs, Sven Ludvig Herman Rydin; Assistant Director-General and Director of Traffic Department, N. L. H. Johanson; Director of Administrative Department, Count A. Hamilton; Director of Line Department, K. E. Landström; Inspector of Wireless Telegraphy, A. S. Litström; Manager of Government School for Wireless Telegraphy, J. G. Holmström.

A The Act of August 31st, 1907, concerning the establishment and working of installations of radiotelegraphy and radiotelephony reads as follows:—

1. Whosoever desires to establish in Sweden, on land, or on board a vessel permanently moored in Swedish waters, an electric installation of radio-telegraphy or radio-telephony for public or private use, must apply for an authorisation from the King.

2. The authorisation of the King must likewise be applied for, by any person or persons desiring to establish on board a Swedish

vessel other than permanently moored, an installation of the kind referred to in Paragraph 1.

3. The authorisation granted by the King, as prescribed in Paragraphs 1 and 2, can only be granted for a certain period. In granting the authorisation, His Majesty prescribes, under the reservation of private rights, the manner and conditions under which the installation may be established and worked.

4. Whosoever establishes or works, without the authorisation of the King or contrary to the provisions prescribed in the authorisation, an installation within the meaning of the present law, is liable to a fine of from 25 to 1,000 kronen if the penalty incurred by this contravention is not included in the Penal Code.

5. If an installation within the meaning of the present law has been established without the authorisation of the King, or contrary to the provisions prescribed simultaneously with the authorisation, or if the authorisation has been revoked later by the King, it is the duty of the Governors of Provinces to take the necessary steps to prevent any use being made of the installation.

6. Every fine imposed under the present law reverts to the State. Fines not paid on account of the insolvency of the delinquent are expurgated by terms of imprisonment as prescribed in the Penal Code.

7. The provisions of this law do not apply to State installations.

8. All regulations and all dispositions concerning foreign vessels not permanently moored in Swedish waters, which may be considered necessary for the proper working in Sweden of installations within the meaning of this Act, are made by the King.

B THE following Royal Decree of June 20th, 1913, which came into force on July 1st, 1913, replaces that of August 31st, 1907 (see YEAR-BOOK OF WIRELESS TELEGRAPHY AND TELEPHONY, 1913, pp. 151-2):—

1. The working of installations of radio-telegraphy or radio-telephony on board a foreign vessel not permanently moored in Swedish waters is, except in cases of distress, prohibited in those parts of the Swedish Archipelago and Swedish waters near to the coast stations which shall be designated by the Direction General of Telegraphs acting conjointly with the Admiralty.

It is the duty of the Director-General of Telegraphs, acting conjointly with the Admiralty, to communicate these provisions to navigators in the way he judges most convenient, and likewise to inform the Governors of the Provinces concerned.

2. In order to exploit such stations in a Swedish port on board foreign vesels above referred to a special authorisation of the General Direction of Telegraphs, acting in conjunction with the Admiralty, must be obtained; the parties interested shall furthermore be bound to conform to the instructions, detailed edicts, if necessary, made by the Direction General of Telegraphs.

3. When an installation of the kind referred to above is exploited on board one of the foreign ships above-mentioned, the interested parties, if no regulation exists to the contrary, shall conform to the instructions

fixed by the International Radio-telegraphic Convention which are in force with the service regulations thereto annexed.

4. Every contravention of this Decree, or of the regulations prescribed by the Direction General of Telegraphs in virtue of Article 2 above, will be subject to a fine of 25 to 1,000 kronen.

The fines revert to the State. Fines not payable by reason of the insolvency of the delinquent are expurgated by terms of imprisonment as laid down in the Penal Code.

5. The provisions of Article 4 hereof shall not apply to vessels of war.

C THE following resolution made by the Director-General of Telegraphs relating to the prohibition of working radio-telegraphic and radio-telephonic installations in proximity to Swedish coast stations was issued on August 22nd, 1913:—

In view of the Royal decision relating to the installing of wireless stations on board of certain Swedish vessels:

In view of the Royal Order of June 20th. 1913, relating to the working in Sweden of radio-telegraphic and radio-telephonic installations on board foreign vessels:

The Direction General of Telegraphs, conjointly with the Admiralty, brings to the notice of interested parties that within a radius of ten nautical miles from the nearest Swedish coast station the operation of radio-telegraphic or radio-telephonic stations established either on board of Swedish vessels or on board of foreign vessels is prohibited during the hours when such coast station is open for traffic, except in cases of distress or for the purpose of corresponding with the nearest coast station.

This resolution does not refer to Swedish ships of war.

(The above Regulation refers to the working of wireless stations on board foreign vessels, only whilst they are within the territorial waters of the Swedish Kingdom.)

D In addition to the Acts and Regulations printed above, we include below such extracts from the 1914 and 1915 Statutes as apply to Wireless Telegraphy. These cover Regulations affecting Ship Stations and the various restrictions imposed on their use whilst within Swedish Territorial Waters.

SWEDISH STATUTES, 1914.

No. 131, DATED 10TH AUGUST, 1914.

His Royal Majesty's Gracious Rescript to H.M.'s Telegraph Department concerning prohibition of the use, within Swedish harbour precincts, of electric installations for wireless telegraphy or telephony on board of any vessel of a country at war.

In consequence of the outbreak of war between foreign powers, We have in connection with the provisions of Article 2 of our gracious proclamation of June 20th, 1913, concerning the use, within the confines of the realm, of electric installations for wireless telegraphy and telephony on board of foreign vessels, thought fit to ordain that until further notice it shall not be permitted to use such installations within

Swedish harbour precincts on board of any vessel of a country at war. Which is hereby graciously brought to your notice for your cognisance and guidance.

SWEDISH STATUTES, 1915.

No. 514 of 23rd December.

Fifth Chapter.

Equipment of Vessels.

I.—Wireless Telegraph Installation.

Art. 56.

Vessels which must be provided with wireless installation.—Vessels which are used for voyages between different countries or between a country and any of its colonies, possessions or protectorates, shall be equipped with wireless telegraph installation, provided however—

That such installation shall not be required if the vessel has fewer than 50 persons on board or if, although the number on board is 50 or over, this is exclusively due to the fact that the master, by reason of sickness among the crew or through other compelling, unforeseen circumstances, has been obliged to supplement the crew, or has saved persons in distress at sea, or by reason of obligation, according to law, has taken with him seamen or other persons;

And that the Board of Trade may, on application, grant exemption from the obligation of having such installation, if the Board, in view of the route or other circumstances concerning the voyage, finds that such installation is not necessary and if such application concerns :—

(*a*) Vessels which do not go out to a distance of more than 150 nautical miles from the nearest coast;

(*b*) Vessels which only in exceptional cases and incidentally have 50 persons or more on board for the reason that they take stowers or stowage labourers with them on a certain part of the voyage, and which on the one hand do not sail from one continent to another, and on the other hand are, during the said part of the voyage, between 30° northern and 30° southern latitude; or

(*c*) Sailing vessels which are of rather primitive construction and which it is practically impossible to equip with wireless installation.

Art. 57.

Concession and classes of vessels.—Concerning H.M.'s permission to carry out such installation as referred to in Art. 56, separate enactments have been issued.

In sanctioning such installation as aforesaid the King will fix the class in which the vessel shall be classified, in accordance with the nature of the attendance of the wireless telegraph station.

Art. 58.

Range of the installation.—The wireless installation shall be sufficiently powerful to be able to transmit in day-time, under normal conditions, signals which can be clearly distinguished at a distance of at least 100 nautical miles from the vessel.

ART. 59.

Spare installation.—Vessels which are to be equipped with wireless installation shall have a spare wireless plant. This shall be placed wholly and entirely in the upper parts of the vessel, as high up as possible, and all its parts shall be fitted up so as to be protected as much as possible.

The spare plant shall have a source of power which is exclusively intended for the spare plant, and which can be brought into action most speedily.

The source of power referred to in the second paragraph of this article shall be capable of acting for at least six hours with a minimum range of 80 nautical miles in the case of vessels, for which uninterrupted attendance of the wireless installation shall have been provided, and of 50 nautical miles in the case of any other vessel.

If the main installation meets the requirements of the first and second paragraphs hereof as regards the spare plant the spare installation shall not be required.

SWITZERLAND.

THERE are at present no laws in existence to regulate wireless telegraphy in Switzerland. The establishment and exploitation of wireless stations is a State monopoly, which is based on the general Federal Law of December 16th, 1907, relating to the administration of telegraphs and telephones.

The Telegraph Administration, however, grants licences, for a limited length of time, for receiving stations only, where these are to be used solely for the reception of time signals and meteorological information. A fee of five francs is charged at the time of granting the licence, and the Telegraph Administration reserves to itself the right to cancel such licence at any time.

TRINIDAD AND TOBAGO.

A—Wireless Telegraphy Ordinance, 1909.

B—Ordinance No. 236.

C—Regulations.

The officer in charge of the Radio-telegraphic Service of these Colonies is the Director of Public Works, who informs us that the two Ordinances (*plus* Regulations) printed below comprise the whole of the legislation at present enacted on the subject. It is, however, intended that the two Ordinances shall be combined shortly and issued in an amended form.

A BE it enacted by the Governor of Trinidad and Tobago with the advice and consent of the Legislative Council thereof as follows:—

1. This Ordinance may be cited as the Wireless Telegraphy Ordinance 1909.

2. No person shall work any apparatus for wireless telegraphy installed on any merchant ship whilst that ship is in the territorial

waters of the Colony, otherwise than in accordance with regulations from time to time made in that behalf by the Governor.

Such regulations may impose penalties recoverable summarily for the breach of any such regulations, not exceeding ten pounds for each offence.

All such regulations shall be published in the *Royal Gazette*, and production of such *Gazette* containing a copy of such regulations shall in all legal proceedings be sufficient evidence of the due making and tenor thereof.

Passed in Council this twentieth day of December, in the year of Our Lord one thousand nine hundred and nine.

No. 236.

An Ordinance relating to Wireless Telegraphy :—

B 1. *Short Title*.—This Ordinance may be cited as the Wireless Telegraphy Ordinance.

2. *Licence*.—It shall not be lawful for any person or corporation to use or establish in this Colony any apparatus or installation for the purposes of wireless telegraphy, without first obtaining from the Governor a licence in that behalf, to be granted on such terms and conditions as the Governor may from time to time prescribe.

3. *Penalty*.—Any person or corporation contravening the provisions of the last preceding section shall be guilty of an offence, and on summary conviction thereof shall be liable to a fine of £50, and the apparatus and installation in respect of which a conviction is obtained may by order of the stipendiary justice before whom such conviction is obtained be forfeited to the use of His Majesty the King.

Regulations.

C 1. All apparatus for wireless telegraphy on board a merchant ship in the territorial waters of the Colony shall be worked in such a way as not to interfere with (*a*) Naval signalling or (*b*) the working of any wireless telegraph station lawfully established, installed, or worked in the Colony or the territorial waters thereof, and in particular the said apparatus shall be worked so as not to interrupt or interfere with the transmission of any messages between wireless telegraph stations established as aforesaid on land and wireless telegraph stations established on ships at sea.

2. No apparatus for wireless telegraphy on board a merchant ship shall be worked or used whilst such ship is in any of the harbours of the Colony, except with the special or general permission in writing of the Director of Public Works of the Colony. Such special or general permission shall only be given to any ship subject to the condition that it shall not exchange signals with another ship except on the private business of the owners.

3. If at any time in the opinion of the Governor an emergency has arisen in which it is expedient for the public service that His Majesty's Government shall have control over the transmission of messages by wireless telegraphy, the use of wireless telegraphy on board merchant ships whilst in the territorial waters shall be subject to such further rules as may be made by the Governor from time to time, and such

rules may prohibit or regulate such use in all cases or in such cases as may be deemed desirable.

4. These regulations shall not apply to the use of wireless telegraphy for the purpose of making or answering signals of distress.

5. Any person committing a breach of these Regulations shall be guilty of an offence, and on conviction shall be liable to a penalty not exceeding ten pounds.

Made by the Governor under the Wireless Telegraphy Ordinance 1909 (35-1909) this third day of February, 1910.

UGANDA PROTECTORATE

THIS Ordinance may be cited as "The Wireless Telegraphs Ordinance," 1908.

2. No person shall use or establish any apparatus or installation for the purpose of operating wireless telegraphs without a licence from the Governor.

Any person contravening the terms of this section shall be liable on conviction to a fine not exceeding Rs. 1,500 or to imprisonment of either kind for a term not exceeding twelve months, and any apparatus or installation in respect of which an offence under this section is committed may be forfeited and sold or disposed of as the Governor may direct.

3. It shall be lawful for the Governor from time to time by rules to prescribe the terms and conditions upon which licences to use or establish apparatus or installations for the purpose of operating wireless telegraphs may be granted.

UNION OF SOUTH AFRICA

See South Africa (Union of).

UNITED STATES OF AMERICA

A—Act to require Apparatus and Operators for Radio Communication on certain Ocean Steamers, 1912.

B—Regulations thereunder.

C—Act to regulate Radio Communication, 13th August, 1912.

D—Regulations, 1st July, 1913.

E—Notice to Berne Bureau.

THE Congress of the United States has delegated to the Department of Commerce the duty of the enforcement of the Wireless Communication Laws and the International Radio-telegraph Convention, and the work is handled through the Bureau of Navigation, Washington. The officers engaged in this duty are as follows:—Secretary of Commerce, William C. Redfield; Assistant Secretary of Commerce, E. F. Sweet; Commissioner of Navigation, E. T. Chamberlain; Deputy Commissioner of Navigation, A. J. Tyrer; Radio Inspector in Charge, W. D. Terrell. There are, in addition, twelve inspectors and assistant

inspectors, stationed at various districts established by the Bureau of Navigation.

A THE following "Act to Require Apparatus and Operators for Radio Communication on certain Ocean Steamers," which was approved on July 23rd, 1912, amends section 1 of the Act approved June 24th, 1910:—

1. That from and after October 1st, 1912, it shall be unlawful for any steamer of the United States or of any foreign country navigating the ocean or the Great Lakes and licensed to carry, or carrying, fifty or more persons, including passengers or crew or both, to leave or attempt to leave any port of the United States unless such steamer shall be equipped with an efficient apparatus for radio communication, in good working order, capable of transmitting and receiving messages over a distance of at least 100 miles, day or night. An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable the sending set for at least four hours to send messages over a distance of at least 100 miles, day or night, and efficient communication between the operator in the radio room and the bridge shall be maintained at all times.

The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of $100.

That the provisions of this section shall not apply to steamers plying between ports, or places, less than 200 miles apart.

2. That this Act, so far as it relates to the Great Lakes, shall take effect on and after April 1st, 1913, and so far as it relates to ocean cargo steamers shall take effect on and after July 1st, 1913: Provided, that on cargo steamers, in lieu of the second operator provided for in this Act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

The remaining sections of the Act of June 24th, 1910, which are unchanged, read as follows:—

2. That for the purposes of this Act apparatus for radio communication shall not be deemed to be efficient unless the company installing it shall contract in writing to exchange, and shall, in fact, exchange, as far as may be physically practicable, to be determined by the master of the vessel, messages with shore or ship stations using other systems of radio communication.

3. That the master or other person being in charge of any such vessel which leaves or attempts to leave any port of the United States in violation of any of the provisions of this Act shall, upon conviction,

be fined in a sum not more than $5,000, and any such fine shall be a lien upon such vessel, and such vessel may be libelled therefor in any district court of the United States within the jurisdiction of which such vessel shall arrive or depart, and the leaving or attempting to leave each and every port of the United States shall constitute a separate offence.

4. That the Secretary of Commerce shall make such regulations as may be necessary to secure the proper execution of this Act by collectors of customs and other officers of the Government.

REGULATIONS.

1. *Administration.*

1. The Department has established for the purpose of enforcing, through radio inspectors and others, the Acts relating to radio communication and the International Convention, the following districts with the principal office for each district at the custom house of the port named:

(1) Boston, Mass.—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

(2) New York, N. Y.—New York (county of New York, Staten Island, Long Island, and counties on the Hudson River to and including Schenectady, Albany, and Rensselaer) and New Jersey (counties of Bergen, Passaic, Essex, Union, Middlesex, Monmouth, Hudson, and Ocean).

(3) Baltimore, Md.—New Jersey (all counties not included in second district), Pennsylvania (counties of Philadelphia, Delaware, all counties south of the Blue Mountains, and Franklin County), Delaware, Maryland, Virginia, District of Columbia.

(4) Savannah, Ga.—North Carolina, South Carolina, Georgia, Florida, Porto Rico.

(5) New Orleans, La.—Alabama, Mississippi, Louisiana, Texas, Tennessee, Arkansas, Oklahoma, New Mexico.

(6) San Francisco, Cal.—California, Hawaii, Nevada, Utah, Arizona.

(7) Seattle, Wash.—Oregon, Washington, Alaska, Idaho, Montana, Wyoming.

(8) Detroit, Mich.—New York (all counties not included in second district), Pennsylvania (all counties not included in third district), West Virginia, Ohio, Michigan (Lower Peninsula).

(9) Chicago, Ill.—Indiana, Illinois, Wisconsin, Michigan (Upper Peninsula), Minnesota, Kentucky, Missouri, Kansas, Colorado, Iowa, Nebraska, South Dakota, North Dakota.

2. Radio inspectors are authorised to communicate directly in their respective districts with collectors of customs, and to co-operate with them in the enforcement of the laws.

3. Whenever practicable, the radio inspector shall satisfy himself on his visit before the departure of a steamer subject to the Act of June 24, 1910, as amended July 23, 1912, that the radio apparatus is

efficient and in good working order within the meaning of the Act. If the apparatus does not comply with the law, the radio inspector will furnish the master with the stub of Form 771 "inspection record," on which will be noted the particulars in which the apparatus does not comply with the law. Where apparatus is found to be in compliance with the law, the stub of Form 771 will not be detached.

4. Where a steamer subject to the Act is without the apparatus and the operators prescribed, or either of them, and is about to attempt to leave port, the radio inspector visiting the vessel shall—

(*a*) Notify the master of the fine to which he will be liable, and of the particulars in respect of which the law has not been complied with;

(*b*) the radio inspector shall submit to the collector of customs of the port a written report stating the exact nature of the violation, the section of the law violated, and the penalties involved, and all of the circumstances in connection therewith which will be of service to the collector and to the Secretary of Commerce in determining what action shall be taken;

(*c*) statements should be obtained from operators, ship officers, or other witnesses at the time the violation is discovered and should accompany the report to the collector of customs;

(*d*) the collector of customs will report the case to the Secretary of Commerce in the usual manner as a navigation fine case.

5. The Act does not authorise the refusal of clearance in case of violation of its provisions, but specifically provides for the imposition of a fine in a sum not more than $5,000.

6. The Act does not apply to a vessel at the time of entering a port of the United States. Radio inspectors and customs officers may, however, accept as evidence of the efficiency of the apparatus and the skill of an operator messages shown to have been transmitted and received by him over a distance of at least 100 miles, by day, during the voyage to the United States.

7. Collectors of customs and radio inspectors are enjoined that the reports required by paragraph 4 (*c*) of these regulations must be precise statements of the facts as the basis for proceedings by the United States Attorney.

8. Masters of vessels entering a port of the United States and expecting to leave under the Act of June 24, 1910, as amended July 23, 1912, should file Form 753a "Radio declaration" (Appendix A) in duplicate with the customs officer at the time of entry. The customs officer will furnish one copy to the radio inspector in order that proper inspection of the radio equipment may be made before departure.

9. For each departure of a steamer under the Act of June 24, 1910, as amended July 23, 1912, the master is required to furnish to the customs officer a certificate in the form of Appendix B (Form 753b) "Master's certificate of radio apparatus." Such certificates shall be retained in the files of the collectors of customs. The collector of customs will arrange for the collection of these certificates at all times.

10. In order to comply with Section 2 of the Act of July 24, 1910, every land station open to general public service, and every station on

board an American vessel of the first or second class engaged in the foreign trade or transoceanic service, shall have as a part of the station equipment a copy of the official Berne list and supplements thereto as issued. Information concerning the use of this list and method of procuring it is given on page 72, paragraph 196.

2. *Operators.*

1. In so far as licensed operators are concerned, a sharp distinction should be drawn between the Act of July 23rd, 1912, which requires apparatus and operators for radio communication on steamers, and the Act of August 13th, 1912, to regulate radio communication.

The Act of July 23rd, 1912, amending the Act of June 24th, 1910, is designed to promote safety at sea through the employment of apparatus and operators to transmit and receive distress calls and other calls relating to perils and aids to navigation. It provides that in the case of American and foreign vessels subject to its provisions "the radio equipment must be in charge of two or more persons skilled in the use of such apparatus." This Act does not require that the operators shall be licensed, and the penalty prescribed in Section 3 of the Act is not incurred by the master of a vessel whose operators are "skilled in the use of such apparatus," even though they may not be licensed.

The Act of August 13th, 1912, is designed to execute in behalf of the United States the International Radiotelegraphic Convention and thus to promote orderly exchanges by radio communication. For this purpose the International Radiotelegraphic Convention (Service Regulations) provides that the service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject.

Section 3 of the Act of August 13th, 1912, carries out this provision of the International Convention by providing licences for operators on American vessels. If an unlicensed person serves in charge or in supervision of the use and operation of the apparatus both he and his employer are liable to a fine of not more than $100 or imprisonment for not more than two months or both. This section and penalty do not apply to operators on foreign ships. But operators on the ships of foreign nations signatory to the International Radiotelegraphic Convention, as shown above, are required to have certificates or licences from their own Governments, and if not so certificated, the obligations of the convention have not been observed. The convention in the Service Regulations provides for this situation.

The Act of July 23rd, 1912, as stated, requires that on American and foreign ships the operators must be "skilled in the use of such apparatus," but does not require that they must be licensed. To facilitate commerce and simplify administration, operators presenting American licences or foreign certificates are accepted as "skilled in the use of such apparatus," except where there may be special reasons to doubt the operator's skill or reliability. Where operators on American or foreign ships do not have such licences or foreign certificates, radio inspectors or customs officers under the Act of July 23rd, 1912, may accept other competent evidence of skill or may examine such operators.

2. The Service Regulations of the International Convention require that—

The service of the station on shipboard shall be carried on by a telegraph operator holding a certificate issued by the Government to which the vessel is subject.

Such certificate shall attest the professional efficiency of the operator as regards—

(*a*) Adjustment of the apparatus and knowledge of its functioning.

(*b*) Transmission and acoustic reception at the rate of not less than 20 words a minute (Continental Morse) for commercial first-grade operators and not less than 12 words per minute for second-grade operators.

(*c*) Knowledge of the regulations governing the exchange of wireless telegraph correspondence.

(*d*) The certificate shall furthermore state that the Government has bound the operator to secrecy with regard to the correspondence.

3. The International Convention has been ratified by the principal maritime nations, dominions, and provinces. Radio operators holding valid certificates issued by foreign Governments which are parties to the convention will be recognised by this Department as persons "skilled in the use of such apparatus" within the meaning of the Act, unless in the case of a specific individual there may be special reason to doubt the operator's skill and reliability. Such certificates should be ready at hand for the inspection of radio inspectors or customs officers before the steamer departs from the United States.

4. In the case of a vessel subject to the Act under the flag of any nation not a party to the International Convention, the radio operator, before the departure of the vessel from the United States, must furnish to the inspector evidence that he is "skilled in the use of the apparatus." This evidence shall consist of an examination on board by the radio inspector.

5. The Department of Commerce issues licences to radio operators certifying the degree of knowledge of radio-telegraphy possessed by them and their ability as operators, under the International Convention. Examinations for operators' licences can be taken at the following points: The United States Navy Yards at Boston, Mass., Brooklyn, N. Y., Philadelphia, Pa., Norfolk, Va., Charleston, S. C., New Orleans, La., Mare Island (San Francisco), Cal., Puget Sound, Wash.; at the Naval stations at Key West, Fla., San Juan, P. R., Honolulu, Hawaii, and Colon, Republic of Panama; also at Fort Wood, New York Harbour, Fort Leavenworth, Kans.; School for Enlisted Specialists, Fort Monroe, Va., and the Army station at Fort Valdez, Alaska; also at the Bureau of Standards and Bureau of Navigation, Washington, D. C.; and by the Department's radio inspectors at the custom houses in their districts and elsewhere, if practicable, by arrangement with them.

Applicants for licences should communicate in advance with the commandants or commanding officers of the Navy yards or Army posts or Naval or Army stations named, or with the Director of the Bureau of Standards, or with the Commissioner of Navigation, or with the radio inspectors at the custom houses in regard to examinations. In

emergencies arrangements for the examination of ship operators can be made on short notice with the naval stations or radio inspectors in different ports. An effort should be made to arrange beforehand for any desired examination.

The operators' licences will be delivered to the successful applicants at the time of examination, or as soon thereafter as possible. The operator's licence is not valid, nor will it be signed by the examining officer, until the oath has been accomplished.

The licence provides that the holder shall take the oath for the preservation of the secrecy of messages before a notary public or other officer authorised to administer oaths.

6. An operator's licence may be granted to any person without regard to sex, nationality, or age, if the applicant can fulfil the requirements for the class of licence desired. Although no stated experience is required, the examinations for the different grades are such as require a proper amount of experience to pass.

The requirements which applicants must meet to secure licences of the several grades and scope and limitations of employment authorised by the licences of the several grades are as follows :—

Commercial extra first grade.—

(*a*) These licences will be given consideration by the Civil Service Commission in examinations for positions requiring knowledge of radio telegraphy, when experience is rated as a part of such examinations.

(*b*) Applicants for the commercial extra first-grade licence must pass a special examination. To be eligible for this examination they must hold commercial first-grade licences, and their certificates of skill in radio communication, issued under the Act of June 24th, 1910, or licences under the Act of August 13th, 1912, must record eighteen months' satisfactory commercial service at sea or at land stations, either or both, during the two years previous to the filing of the application for examination, as shown by indorsement on the licence service records, or other satisfactory evidence, and provided that the applicants have not been penalised for a violation of the radio laws and regulations.

(*c*) A speed of at least thirty words per minute, Continental Morse, and twenty-five words per minute, American Morse (five letters to the word), must be attained. The technical questions and the questions on the radio laws and regulations will be considerably wider in scope than those for commercial first grade, and a higher percentage will be required.

(*d*) All examination papers, including the code test sheets, will be marked and forwarded to the Commissioner of Navigation, with a recommendation by the radio inspector or examining officer. Examination papers will be marked upon the basis of 100, and licences will be recommended only if 80 or better is attained.

(*e*) Licences of this grade will be issued by the Commissioner of Navigation, indorsed by the Secretary of Commerce, and delivered to the successful applicant through the examining officer.

Commercial first grade.—The applicant must pass a satisfactory examination in—

(*a*) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wave to another.

(*b*) Transmitting and receiving by ear at a speed of not less than 20 words a minute in Continental Morse Code (five letters, numerals, or other characters to the word).

(*c*) Use and care of storage battery or other auxiliary power apparatus.

(*d*) Knowledge of the international regulations applying to radio communication in force.

(*e*) Knowledge of requirements of the Acts of Congress to regulate radio communication.

Commercial second grade.—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall be not less than 12 words in Continental Morse Code, and the examination in the subjects will not be as comprehensive as that given first-grade operators.

Commercial cargo grade.—The examination should be conducted so as to determine the following facts:—

(*a*) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the distress signal (SOS) when included in a list of other words or signals sent slowly (approximately five words a minute).

(*b*) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the radio call letters of the vessel on which he desires to operate, when sent slowly and repeated several times.

(*c*) That the applicant is sufficiently familiar with the type of receiving apparatus of the vessel on which he desires to operate to determine by a buzzer or similar test that the detector or receiving apparatus is properly adjusted to receive signals.

Amateur first grade.—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus *which he wishes to operate*, and of the regulations of the International Convention and Acts of Congress in so far as they relate to interference with other radio communications, and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in Continental Morse at a speed sufficient to enable him to recognise distress calls or the official "Keep out" signals. A speed of at least five words per minute must be attained (five letters, numerals, or other characters to the word).

7. *Renewal of licences.*—

(*a*) Renewal licences may be issued to commercial grade operators without examination, provided the service records on the backs of licences properly certify to three months' satisfactory commercial service during the last six months of the licence term. If expired licences have been lost or destroyed, an affidavit must be submitted attesting the facts regarding the manner in which

the licence was lost. In such cases evidence of the required satisfactory commercial service may be submitted in the form of letters, signed by masters and employers.

(*b*) Operators holding licences of grades other than commercial, who submit satisfactory evidence to the examining officer, showing actual operation of radio apparatus for three months during the last six months of the licence term, may be issued new licences without examination. Otherwise, applicants for renewals will be examined in the usual manner.

(*c*) Renewals or new licences may be issued a reasonable length of time previous to the expiration of existing licences, but must bear the exact date of issue, which must correspond with the date on the back of Form 756 forwarded to the Commissioner of Navigation.

(*d*) Operators who fail to apply for renewal of their licences on or prior to the date of expiration must be re-examined. If, because of circumstances over which the applicant has no control, an operator is unable to apply for renewal of licence on or prior to the date of expiration, an affidavit may be submitted to the Commissioner of Navigation through the radio inspector or examining officer, attesting to the facts, which will be considered by the Commissioner of Navigation, who will advise the radio inspector or examining officer in regard to the issue of a renewal of the licence without re-examination.

(*e*) Service records must be completed and signed only by masters, employers, or the duly authorised agents of either.

(*f*) Any improper alteration of the service record, or the forgery of masters' or employers' signatures, constitute a violation of the regulations, and the operator may suffer suspension of licence for a period not exceeding one year, at the discretion of the Secretary of Commerce.

8. *Temporary permits.*—Section 3 of the Act of August 13th, 1912, provides :—

In case of emergency, the Secretary of Commerce may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the Radio Ship Act of June 24th, 1910.

The permits should be issued only to persons who the collector of customs has reason to believe are skilled in the use of the apparatus, but have not had the opportunity to present themselves for examination before Government officers authorised to conduct examinations and furnish licences. The temporary permit is valid for one trip only. The collector of customs will forward to the Department of Commerce (Bureau of Navigation) a report covering each temporary permit issued and the reasons for its issue.

9. *Ship stations* on vessels of the United States are classed under the Act of August 13th, 1912, as follows :—

Class A.—Ocean passenger steamers which are required to carry at least two operators and maintain a constant skilled watch. On vessels of this class carrying or licensed to carry less than 100 passengers one operator should hold the commercial first-grade licence and the other

may hold a second-grade licence. Vessels of this class carrying or licensed to carry 100 or more passengers and under the London Convention vessels having constant service should have at least two operators, each holding commercial first-grade licences.

Class B.—Cargo steamers which have crews of 50 or more are required to carry two operators, one holding a second-grade commercial licence or higher; the second may be a member of the crew holding a cargo or amateur first-grade operator's licence, requiring a transmitting and receiving ability of at least five words per minute. Vessels of this class maintain a constant receiving watch, but the transmitting service may be during limited hours as required by the vessel.

Class C.—Vessels of this class are those voluntarily equipped with radio apparatus and not subject to the Act quoted herein. The vessels have no fixed hours of service, but should be provided with at least one operator holding a commercial first or second-grade licence.

The following-named vessels come in this class:—

(1) Passenger steamers where the licensed capacity and number of crew combined number less than 50.
(2) Cargo steamers with crews less than 50.
(3) Tugs and towing steamers, etc., with crews less than 50.
(4) Motor vessels or yachts.
(5) Sailing vessels and barges.
(6) Steam yachts with crews less than 50.
(7) Steamers of any kind plying between ports or places less than 200 miles apart.

3. *Apparatus.*

1. When the radio apparatus is certified as complying with the requirements of law by the competent authorities of a foreign Government, such certificate will be recognised by this Department, but the radio inspector or customs officer may, if he deem it necessary or desirable, satisfy himself that the apparatus is in good working order.

2. Whenever practicable, the radio inspector shall satisfy himself on his visit before the departure of a steamer subject to the Act that the apparatus is efficient and in good working order within the meaning of the Act, and, if satisfied, he shall issue a certificate in the form in Appendix A. The duplicate of these certificates should be filed with the collector of customs as a record of the radio-equipment of vessels sailing from his port.

3. When inspection of the apparatus by a radio inspector or customs officer is not practicable, the master of the steamer may furnish to the visiting customs officer a certificate in the form of Appendix B. Such certificate shall be retained in the files of the collector of customs.

4. The current necessary to transmit and receive messages shall at all times while the steamer is under way be available for the radio operator's use.

5. An auxiliary power supply, independent of the vessel's main electric power plant, must be provided which will enable messages to

DR. W. H. ECCLES, D.SC.

(*For whose Biographical Notice see page* 878.)

[*To face page* 352.

be sent for at least four hours over a distance of at least 100 miles, day or night.

Storage battery sets of sufficient voltage and capacity to operate the regular motor generator or source of primary alternating current are recommended. A complete separate auxiliary set comprising power source and wireless equipment may be provided if the required results are obtained.

Attention is invited to the Act of Congress, approved October 22nd, 1914, effective on and after date of approval, amending Section 4472, Revised Statutes, and which reads as follows:—

"Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, that section forty-four hundred and seventy-two of the Revised Statutes of the United States of America be, and the same is hereby, amended by adding thereto the following provision:—

"'Provided, however, that nothing in the foregoing or following section of this Act shall prohibit the transportation and use by vessels carrying passengers or freight for hire of gasoline or any of the products of petroleum for the operation of engines to supply an auxiliary lighting and wireless system independent of the vessels main power plant. Provided further, that the transportation or use of such gasoline or any of the products of petroleum shall be under such regulations as shall be prescribed by the board of supervising inspectors, with the approval of the Secretary of Commerce.'"

In the near future regulations authorised by the last proviso of the amendment will be adopted by an executive committee of the Board of Supervising Inspectors of Steam Vessels. When these regulations are approved they will be published in this bulletin as an amendment to the Radio Laws and Regulations, edition of July 27th, 1914, page 49, paragraph 8.

If an internal-combustion engine is provided as the only means of auxiliary power supply to operate the radio equipment, under the Act of June 24th, 1910, amended July 23rd, 1912, it will be necessary for radio inspectors to determine if the equipment is efficient under the Ship Act, and in accordance with the regulations governing radio communication, page 49, paragraphs 1 to 5, inclusive.

Until such regulations are approved, gasoline may not be carried except with the approval of the Secretary of Commerce in each case, and then subject to change to meet such requirements as may be later promulgated.

6. Efficient communication between the radio room and the bridge must be maintained. A speaking tube or telephone will comply with this requirement. A bell and messenger service will not be acceptable unless there are special conditions justifying this equipment. The speaking tube or telephone must terminate in the radio room and on the bridge, or in the chart room if readily accessible from the bridge. If the radio room is adjacent to or accessible from the bridge so that orders may be transferred direct, no means of communication will be required. Any arrangement calling for the services of a third person to transmit the message will not be satisfactory. The radio inspectors will notify the ship authorities whether the means of communication provided is satisfactory at the time of inspection.

7. One extra pair of head telephones, extra cords, and extra detectors should always be kept on hand.

8. A storage battery voltmeter, hydrometer, a supply of electrolyte, and distilled water should be a part of the regular equipment, but are not prescribed in terms by statute. The absence of these and similar inexpensive emergency articles will be brought to the attention of the master and of the company installing the apparatus by the radio inspector, in writing, and if after a reasonable interval they have not been supplied, the inspector will communicate the fact to the Commissioner of Navigation.

N.B.—Under the provisions of Section 4405, Revised Statutes of the United States, the Board of Supervising Inspectors, Steamboat-Inspection Service, at a regular annual meeting held in Washington, D. C., on March 16th, 1915, adopted the following resolution amending the General Rules and Regulations, containing provisions for auxiliary lighting and wireless systems, in pursuance of an Act of Congress approved October 22nd, 1914, amending Section 4472, Revised Statutes.

These amendments to the rules having received the approval of the Secretary of Commerce on March 17th, 1915, have now the force of law and must be observed accordingly.

The resolution referred to reads as follows:—

"That the following be made Section 7, Rule IX., Ocean and Coastwise, Section 6, Rule XI., Lakes, Bays, and Sounds, and Section 6, Rule XI., Rivers:

"Vessels carrying passengers or freight for hire permitted under the authority of the act of Congress approved October 22nd, 1914, amending Section 4472, Revised Statutes of the United States, to transport and use gasoline or any of the products of petroleum for the operation of engines to supply an auxiliary lighting and wireless system independent of the vessel's main power plant, shall be allowed to carry not to exceed 40 gallons of gasoline or any of the products of petroleum for such purposes when contained in a seamless steel tank, cylindrical in form, not less than one-fourth (.25) of an inch thick, and of a capacity of at least 10 per cent. more than the volume of the contents. The tank shall be tinned on the inside and tested to 300 pounds pressure to insure tightness, and fitted with a vent pipe of ample capacity, with no angles in pipe greater than 45°, opening to the atmosphere at a point not less than 10 feet above the highest house, the vent pipe to end with a U bend with the opening protected by wire gauze. The filling pipe or cap shall be entirely independent of other connections. The tank shall be carried on the highest deck of the steamer and so located that there may be a free circulation of air all round it.

"Steamers engaged in transoceanic service or on voyages of more than ten days' duration in either direction may carry such quantities of gasoline or any of the products of petroleum as may be necessary to supply an auxiliary service already installed, the tanks already installed and the location of same being allowed for this purpose. On steamers where the auxiliaries are maintained by engines using the heavy oils, the oil may be carried in quantities not to exceed fifteen tons, when contained in iron or steel tanks of sufficient strength to withstand the action of sea or temperature, and

so located as to be properly insulated or ventilated if either is necessary.

"All tanks shall be firmly and properly secured to prevent being torn away from beds or saddles by heavy weather or excessive list of the ship, and shall be the object of daily inspection by the officers of the ship intrusted with their care.

"There shall be placed within five feet of every tank containing gasoline, benzine, or naphtha not less than two fire extinguishers of approved type which have demonstrated a capacity for extinguishing burning gasoline, which fire extinguishers shall be in addition to the fire extinguishers already required."

4. *Constant Watch.*

On vessels of the United States it is the statutory duty of the master to see that one operator is on duty at all times. The radio service of the ship is under the supreme authority of the master.

5. *Miscellaneous.*

1. The amended Act applies to vessels licensed to carry as well as those actually carrying 50 or more persons, etc.

2. Distances under the Act are to be computed in nautical miles.

6. *Additions or Amendments.*

Additional or emendatory regulations will be issued from time to time as they may appear necessary.

APPENDIX A.—*RADIO SERVICE FORM* 753A.

RADIO DECLARATION.

(To be submitted in duplicate).

DEPARTMENT OF COMMERCE.

Bureau of Navigation.

Radio Service.

NOTICE.—"The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of one hundred dollars."—*Act of July 23rd, 1912.*

PORT OF ——— ———,

Date ——— ———, 191—.

This is to certify that the ——— ———, S.S. ———, of the
(Nationality.)
——— ——— ———, of which I am master, entered this port on
(Name of company or line).
——— ———, 191—, having in crew ——— persons and licensed
(Number.)
or certified to carry ——— passengers; that the said vessel {is / is not}
(Number.)
equipped with radio apparatus as required by the act of June 24th, 1910,

as amended July 23rd, 1912; that the radio station is in charge of ——— properly licensed radio operators and the apparatus is in
(Number.)
{ efficient / inefficient } condition.

——— ——— ———,
Master or Agent.

This form should be filed in duplicate with the collector of customs at time of entry, who will furnish one copy to the radio inspector of the district on the date of entry in order that proper inspection may be made of the radio apparatus prior to the clearance of the vessel.

APPENDIX B.—*RADIO SERVICE FORM* 753B.

Master's Certificate of Radio Apparatus.

NOTICE.

The radio equipment must be in charge of two or more persons skilled in the use of such apparatus, one or the other of whom shall be on duty at all times while the vessel is being navigated. Such equipment, operators, the regulation of their watches, and the transmission and receipt of messages, except as may be regulated by law or international agreement, shall be under the control of the master, in the case of a vessel of the United States; and every wilful failure on the part of the master to enforce at sea the provisions of this paragraph as to equipment, operators, and watches shall subject him to a penalty of $100. (Act of July 23rd, 1912.)

PORT OF ——— ———,
——— ———, 191—.

This is to certify that I have to-day examined the apparatus for radio communication on the S.S. ———, of which I am master, about to leave this port for ———, and I have found the same efficient and in good working order, as prescribed by the Act of June 24, 1910, as amended by the Act of July 23, 1912.

(Signed) ——— ———, *Master.*

C An Act to regulate radio-communication, approved August 13th, 1912:—

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That a person, company, or corporation within the jurisdiction of the United States shall not use or operate any apparatus for radio communication as a means of commercial intercourse among the several States, or with foreign nations, or upon any vessel of the United States engaged in interstate or foreign commerce, or for the transmission of radiograms or signals the effect of which extends beyond the jurisdiction of the State or Territory in which the same are made, or where interference would be caused thereby with the receipt of messages or signals from beyond the jurisdiction of the said State or Territory, except under and in accordance with a licence, revocable for cause, in that behalf granted by the Secretary of Commerce upon application therefor; but nothing in this Act shall be construed to apply to the transmission and exchange of radiograms or signals between points situated in the

same State: *Provided,* That the effect thereof shall not extend beyond the jurisdiction of the said State or interfere with the reception of radiograms or signals from beyond said jurisdiction; and a licence shall not be required for the transmission or exchange of radiograms or signals by or on behalf of the Government of the United States, but every Government station on land or sea shall have special call letters designated and published in the list of radio stations of the United States by the Department of Commerce. Any person, company, or corporation that shall use or operate any apparatus for radio communication in violation of this section, or knowingly aid or abet another person, company, or corporation in so doing, shall be deemed guilty of a misdemeanour, and on conviction thereof shall be punished by a fine not exceeding $500, and the apparatus or device so unlawfully used and operated may be adjudged forfeited to the United States.

Sec. 2. That every such licence shall be in such form as the Secretary of Commerce shall determine, and shall contain the restrictions, pursuant to this Act, on and subject to which the licence is granted; that every such licence shall be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico, and shall specify the ownership and location of the station in which said apparatus shall be used and other particulars for its identification and to enable its range to be estimated; shall state the purpose of the station, and, in case of a station in actual operation at the date of passage of this Act, shall contain the statement that satisfactory proof has been furnished that it was actually operating on the above-mentioned date; shall state the wave length or the wave lengths authorised for use by the station for the prevention of interference and the hours for which the station is licensed for work; and shall not be construed to authorise the use of any apparatus for radio communication in any other station that that specified. Every such licence shall be subject to the regulations contained herein, and such regulations as may be established from time to time by authority of this Act or subsequent Acts and treaties of the United States. Every such licence shall provide that the President of the United States in time of war or public peril or disaster may cause the closing of any station for radio communication and the removal therefrom of all radio apparatus, or may authorise the use or control of any such station or apparatus, by any department of the Government, upon just compensation to the owners.

Sec. 3. That every such apparatus shall at all times, while in use and operation as aforesaid be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce and Labour. Every person so licensed who in the operation of any radio apparatus shall fail to observe and obey regulations contained in or made pursuant to this Act or subsequent Acts or treaties of the United States or any one of them, or who fail to enforce obedience thereto by an unlicensed person while serving under his supervision, in addition to the punishment and penalties herein prescribed, may suffer the suspension of the said licence for a period to be fixed by the Secre-

tary of Commerce and Labour not exceeding one year. It shall be unlawful to employ any unlicensed person or for any unlicensed person to serve in charge or in supervision of the use and operation of such apparatus, and any person violating this provision shall be guilty of a misdemeanour, and on conviction thereof shall be punished by a fine of not more than $100 or imprisonment for not more than two months or both, in the discretion of the court, for each and every such offence: *Provided*, That in case of emergency the Secretary of Commerce and Labour may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of June 24, 1910.

Sec. 4. That for the purpose of preventing or minimising interference with communication between stations in which such apparatus is operated, to facilitate radio communication, and to further the prompt receipt of distress signals, said private and commercial stations shall be subject to the regulations of this section. These regulations shall be enforced by the Secretary of Commerce and Labour through the collectors of customs and other officers of the Government as other regulations herein provide for.

The Secretary of Commerce and Labour may, in his discretion, waive the provisions of any or all of these regulations when no interference of the character above mentioned can ensue.

The Secretary of Commerce and Labour may grant special temporary licences to stations actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will ensure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations.

In these regulations the naval and military stations shall be understood to be stations on land.

REGULATIONS.

1. *Normal Wave Length.*—Every station shall be required to designate a certain definite wave length as the normal sending and receiving wave length of the station. This wave length shall not exceed 600 metres or it shall exceed 1,600 metres. Every coastal station open to general public service shall at all times be ready to receive messages of such wave lengths as are required by the Berlin convention. Every ship station, except as hereinafter provided, and every coast station open to general public service shall be prepared to use two sending wave lengths, one of 300 metres and one of 600 metres, as required by the international convention in force: *Provided*, That the Secretary of Commerce and Labour may, in his discretion, change the limit of wave length reservation made by regulations 1 and 2 to accord with any international agreement to which the United States is a party.

2. *Other Wave Lengths.*—In addition to the normal sending wave length all stations, except as provided hereinafter in these regulations, may use other sending wave lengths: *Provided*, That

they do not exceed 600 metres or that they do exceed 1,600 metres: *Provided further,* That the character of the waves emitted conforms to the requirements of regulations 3 and 4 following.

3. *Use of a "Pure Wave."*—At all stations if the sending apparatus, to be referred to hereinafter as the "transmitter," is of such a character that the energy is radiated in two or more wave lengths, more or less sharply defined, as indicated by a sensitive wave meter, the energy in no one of the lesser waves shall exceed 10 per cent. of that in the greatest.

4. *Use of a "Sharp Wave."*—At all stations the logarithmic decrement per complete oscillation in the wave trains emitted by the transmitter shall not exceed two-tenths, except when sending distress signals or signals and messages relating thereto.

5. *Use of "Standard Distress Wave."*—Every station on shipboard shall be prepared to send distress calls on the normal wave length designated by the international convention in force, except on vessels of small tonnage unable to have plants insuring that wave length.

6. *Signal of Distress.*—The distress call used shall be the international signal of distress:— . . . — — — . . .

7. *Use of Broad "Interfering Wave" for Distress Signals.*—When sending distress signals, the transmitter of a station on shipboard may be tuned in such a manner as to create a maximum of interference with a maximum of radiation.

8. *Distance Required for Distress Signals.*—Every station on shipboard, wherever practicable, shall be prepared to send distress signals of the character specified in regulations 5 and 6, with sufficient power to enable them to be received by day over sea a distance of 100 nautical miles by a shipboard station equipped with apparatus for both sending and receiving equal in all essential particulars to that of the station first mentioned.

9. *"Right of Way" for Distress Signals.*—All stations are required to give absolute priority to signals and radiograms relating to ships in distress; to cease all sending on hearing a distress signal; and, except when engaged in answering or aiding the ship in distress, to refrain from sending until all signals and radiograms relating thereto are complete.

10. *Reduced Power for Ships near a Government Station.*—No station on shipboard, when within fifteen nautical miles of a naval or military station, shall use a transformer input exceeding one kilowatt, nor, when within five nautical miles of such a station, a transformer input exceeding one-half kilowatt, except for sending signals of distress, or signals or radiograms relating thereto.

11. *Intercommunication.*—Each shore station open to general public service between the coast and vessels at sea shall be bound to exchange radiograms with any similar shore station and with any ship station without distinction of the radio systems adopted by such stations, respectively, and each station on shipboard shall be bound to exchange radiograms with any other station on shipboard

without distinction of the radio systems adopted by each station, respectively.

It shall be the duty of each such shore station, during the hours it is in operation, to listen in at intervals of not less than fifteen minutes and for a period of not less than two minutes, with the receiver tuned to receive messages of 300 metre wave lengths.

12. *Division of Time.*—At important seaports and at all other places where naval or military and private or commercial shore stations operate in such close proximity that interference with the work of naval and military stations cannot be avoided by the enforcement of the regulations contained in the foregoing regulations concerning wave lengths and character of signals emitted, such private or commercial shore stations as do interfere with the reception of signals by the naval and military stations concerned shall not use their transmitters during the first fifteen minutes of each hour, local standard time. The Secretary of Commerce and Labour may, on the recommendation of the department concerned, designate the station or stations which may be required to observe this division of time.

13. *Government Stations to Observe Division of Time.*—The naval or military stations for which the above-mentioned division of time may be established shall transmit signals or radiograms only during the first fifteen minutes of each hour, local standard time, except in case of signals or radiograms relating to vessels in distress, as hereinbefore provided.

14. *Use of Unnecessary Power.*—In all circumstances, except in case of signals or radiograms relating to vessels in distress, all stations shall use the minimum amount of energy necessary to carry out any communication desired.

15. *General Restrictions on Private Stations.*—No private or commercial station not engaged in the transaction of *bona fide* commercial business by radio communication or in experimentation in connection with the development and manufacture of radio apparatus for commercial purposes shall use a transmitting wave length exceeding 200 metres, or a transformer input exceeding one kilowatt, except by special authority of the Secretary of Commerce and Labour contained in the licence of the station: *Provided*, That the owner or operator of a station of the character mentioned in this regulation shall not be liable for a violation of the requirements of the third or fourth regulations to the penalties of $100 or $25, respectively, provided in this section unless the person maintaining or operating such station shall have been notified in writing that the said transmitter had been found, upon tests conducted by the Government, to be so adjusted as to violate the said third and fourth regulations, and opportunity has been given to said owner or operator to adjust said transmitter in conformity with said regulations.

16. *Special Restrictions in the Vicinities of Government Stations.*—No station of the character mentioned in regulation 15 situated within five nautical miles of a naval or military station

shall use a transmitting wave length exceeding 200 metres or a transformer input exceeding one-half kilowatt.

17. *Ship Stations to Communicate with Nearest Shore Stations.*—In general, the shipboard stations shall transmit their radiograms to the nearest shore station. A sender on board a vessel shall, however, have the right to designate the shore station through which he desires to have his radiograms transmitted. If this cannot be done, the wishes of the sender are to be complied with only if the transmission can be effected without interfering with the service of other stations.

18. *Limitations for Future Installations in Vicinities of Government Stations.*—No station on shore not in actual operation at the date of the passage of this Act shall be licensed for the transaction of commercial business by radio communication within fifteen nautical miles of the followng naval or military stations—to wit: Arlington, Virginia, Key West, Florida, San Juan, Porta Rico, North Head and Tatoosh Island, Washington, San Diego, California; and those established or which may be established in Alaska and in the Canal Zone; and the head of the department having control of such Government stations shall, so far as is consistent with the transaction of governmental business, arrange for the transmission and receipt of commercial radiograms under the provisions of the Berlin convention of 1906 and future international conventions or treaties to which the United States may be a party, at each of the stations above referred to and shall fix the rates therefor, subject to control of such rates by Congress. At such stations and wherever and whenever shore stations open for general public business between the coast and vessels at sea under the provisions of the Berlin convention of 1906 and future international conventions and treaties to which the United States may be a party shall not be so established as to ensure a constant service day and night without interruption, and in all localities wherever and whenever such service shall not be maintained by a commercial shore station within 100 nautical miles of a naval radio station, the Secretary of the Navy shall, so far as is consistent with the transaction of Government business, open naval radio stations to the general public business described above, and shall fix rates for such service, subject to control of such rates by Congress. The receipts for such radiograms shall be covered into the Treasury as miscellaneous receipts.

19. *Secrecy of Messages.*—No person or persons engaged in or having knowledge of the operation of any station or stations shall divulge or publish the contents of any messages transmitted or received by such station, except to the person or persons to whom the same may be directed, or their authorised agent, or to another station employed to forward such message to its destination, unless legally required so to do by the court of competent jurisdiction or other competent authority. Any person guilty of divulging or publishing any message, except as herein provided, shall, on conviction thereof, be punishable by a fine of not more than $250 or imprisonment for a period of not exceeding three months, or both fine and imprisonment, in the discretion of the court.

20. *Penalties.*—For violation of any of these regulations, subject to which a licence under sections 1 and 2 of this Act may be issued, the owner of the apparatus shall be liable to a penalty of $100, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any such regulations the licence may be revoked.

For violation of any of these regulations, except as provided in regulation 19, subject to which a licence under section 3 of this Act may be issued, the operator shall be subject to a penalty of $25, which may be reduced or remitted by the Secretary of Commerce and Labour, and for repeated violations of any such regulations the licence shall be suspended or revoked.

Sec. 5. That every licence granted under the provisions of this Act for the operation or use of apparatus for radio communication shall prescribe that the operator thereof shall not wilfully or maliciously interfere with any other radio communication. Such interference shall be deemed a misdemeanour, and upon conviction thereof the owner or operator, or both, shall be punishable by a fine of not to exceed $500 or imprisonment for not to exceed one year, or both.

Sec. 6. That the expression "radio communication" as used in this Act means any system of electrical communication by telegraphy or telephony without the aid of any wire connecting the points from and at which the radiograms, signals, or other communications are sent or received.

Sec. 7. That a person, company, or corporation within the jurisdiction of the United States shall not knowingly utter or transmit, or cause to be uttered or transmitted, any false or fraudulent distress signal or call or false or fraudulent signal, call, or other radiogram of any kind. The penalty for so uttering or transmitting a false or fraudulent distress signal or call shall be a fine of not more than $2,500 or imprisonment for not more than five years, or both, in the discretion of the court, for each and every such offence, and the penalty for so uttering or transmitting, or causing to be uttered or transmitted, any other false or fraudulent signal, call, or other radiogram shall be a fine of not more than $1,000 or imprisonment for not more than two years, or both, in the discretion of the court, for each and every such offence.

Sec. 8. That a person, company, or corporation shall not use or operate any apparatus for radio communication on a foreign ship in territorial waters of the United States otherwise than in accordance with the provisions of sections 4 and 7 of this Act and so much of section 5 as imposes a penalty for interference. Save as aforesaid, nothing in this Act shall apply to apparatus for radio communication on any foreign ship.

Sec. 9. That the trial of any offence under this Act shall be in the district in which it is committed, or if the offence is committed upon the high seas or out of the jurisdiction of any particular State or district, the trial shall be in the district where the offender may be found or into which he shall be first brought.

Sec. 10. That this Act shall not apply to the Philippine Islands.

Sec. 11. That this Act shall take effect and be in force on and after four months from its passage.

. . . .

N.B.—The United States Court, at Norfolk (Virginia), has decided that vessels entering American ports for bunker coal only are not subject to the provisions of the U.S. Wireless Telegraph Act, making it compulsory for certain classes of vessels to carry wireless telegraph outfits.

D THE following Regulations were issued on July 1st, 1913:—

Part 1. Licences—Apparatus.

A. Apparatus Exempt from Licence.

The Act does not apply either afloat or ashore to—

(*a*) Apparatus for radio communication which merely receives radiograms and is not equipped for sending.

(*b*) Apparatus for the transmission of radiograms exclusively between points in the same State, if the effect of such transmission does not extend beyond the State (so as to interfere with the radio communication of other States), or if the effect of such transmission does not interfere with the reception of radiograms from beyond the State (so as to interfere with the interstate radio communication of that State).

(*c*) Apparatus for radio communication which has been issued to the Organised Militia by the War Department or to the Naval Militia by the Navy Department, and is used for official purposes only.

The owner or operator of any apparatus who may be in doubt whether his apparatus, under this paragraph, is exempt from licence may write the facts to the radio inspector for his district or to the Commissioner of Navigation, Department of Commerce, Washington, D. C., before applying for a licence.

B. Ship Stations.

The apparatus for transmission of radiograms, or signals on any vessel of the United States not permanently moored, requires a licence.

For the purposes of the administration of the Act, ship stations or vessels of the United States shall be of these classes:

Class A.—Ocean and Great Lakes passenger steamers subject to the Act of July 23rd, 1912, and required to carry two operators and maintain a constant skilled watch.

Class B.—Cargo steamers with crews of 50 or more, required to carry two operators, the second of whom may be a member of the crew certified as competent to receive distress calls, etc., maintaining a transmitting service during limited hours but a constant receiving watch.

Class C.—Vessels voluntarily equipped with radio apparatus and not subject to the Act of June 24th, 1910, as amended July 23rd, 1912, with no fixed hours of service, such as—

1. Passenger steamers, where the licensed capacity and number of crew combined are less than 50.

2. Cargo steamers with crews less than 50.

3. Tugs and towing steamers, etc., with crews less than 50.

4. Motor vessels, motor yachts.

5. Sailing vessels and barges.

6. Steam yachts with crews less than 50.

7. Steamers of any kind plying between ports or places less than 200 miles apart.

C. Land Stations.

Apparatus for radio communication on land within the jurisdiction of the United States (excluding the Philippine Islands and excluding apparatus of the Government of the United States) must be licensed if—

(*a*) The apparatus is a means of commercial intercourse among the several States or with foreign nations; or

(*b*) The apparatus transmits radiograms or signals the effect of which at any time extends beyond the State; or

(*c*) The apparatus interferes with the receipt of messages in any State from beyond such State.

For the purposes of the administration of the Act, stations on land are divided into two general descriptions, according to geographical location:

I. Coast or Shore Stations are stations which transmit messages to vessels at sea or on the Great Lakes or whose operations can affect the transmission of messages between ship and ship, or ship and coast. Vessels of the United States permanently moored are classed as coast stations under the International Convention.

II. Inland Stations are stations which cannot transmit messages to vessels at sea or on the Great Lakes and whose operations can not affect the transmission of messages between ship and ship, or ship and coast. This may be due to their geographical location or to their range, dependent on power and aerial, or conditions. In some instances actual inspection may be necessary to determine whether a station should be licensed as a coast station or an inland station.

An operator or owner in doubt as to the classification of his station should communicate the facts to the radio inspector of his district when applying for a licence.

As the means for enforcing the radio laws are limited, it is necessary to give ship and commercial stations precedence over amateur stations. The owner of an amateur station may operate his station in accordance with the laws if his application for a licence has been properly filed but has not been acted upon. An application for an operator's licence must also have been filed and every effort made to obtain the licence before the station may be operated.

"Provisional" station licences are issued to amateurs remote from the headquarters of the radio inspector of the district in which the station is located. These licences are issued as a matter of convenience and record. If, upon inspection, the station is found to

comply with the law, the inspector will strike out the word "Provisional" and insert the date of inspection and his signature at the bottom of the licence.

If such a station is found not to comply with the law, the provisional licence may be cancelled until such time as the apparatus is readjusted to meet the requirements of the law: *Provided, however*, that consideration will be given to any reports of interference filed against such a station.

Classes of Land Stations.

Both coast stations (the words "coast stations," "shore stations," and "coastal stations" are used interchangeably) and inland stations are divided for the purposes of the administration of the Act into the following classes:—

1. Public-service stations, (*a*) general, (*b*) limited.
2. Limited commercial stations.
3. Experiment stations for the development of radio communication.
4. Technical and training school stations.
5. General amateur stations.
6. Special amateur stations.
7. Restricted amateur stations.

Description of Classes.

1. (*a*) *Public-service stations, general*, are those open to general business between coast and ships or between land stations, and include those operated by common carriers under the Act of February 4th, 1887, to regulate commerce, amended June 18th, 1910. They are required to maintain a constant receiving service when open. Every coastal station open to public service shall at all times be ready to receive messages of such wave lengths as are required by the International Convention in force. (Sec. 4, first regulation, Act of August 13th, 1912.)

Whenever such stations do not insure a constant service, transmitting and receiving day and night without interruption, the Secretary of the Navy is directed to open naval radio stations within 100 miles thereof to public business. (Sec. 4, 18th regulation, Act of August 13th, 1912.) The Secretary of War is authorised by the Act of May 26th, 1900 (31 Stat., 206), to open Alaskan military stations to public service.

1. (*b*) *Public-service stations, limited*, are reserved for a limited public service, determined by the object of the correspondence or other circumstances independent of the system employed. Stations of this class transmit and receive public messages to and from certain stations only, which are designated in the licence.

2. *Limited commercial stations* are not open to public service and are licensed for a specific commercial service or services defined in the licence. Stations of this class must not transmit to or accept public messages from other stations.

3. *Experiment stations*.—The Secretary of Commerce is authorised by section 4 of the Act to grant special temporary licences "to stations

actually engaged in conducting experiments for the development of the science of radio communication, or the apparatus pertaining thereto, to carry on special tests, using any amount of power or any wave lengths, at such hours and under such conditions as will insure the least interference with the sending or receipt of commercial or Government radiograms, of distress signals and radiograms, or with the work of other stations." Applicants for such licences should state any technical result they have already produced, their technical attainments, etc. The fact that an applicant desires to experiment with his equipment does not justify or require a licence of this class. Most experiments can be made within the limitations of general and restricted amateur station licences or by use of an artificial antenna to prevent radiation.

4. *Technical and training school stations* will be licensed in a separate class, according to the degree of technical training attained and imparted and to local conditions.

5. *General amateur stations* are restricted to a transmitting wave length not exceeding 200 metres and a transformer input not exceeding 1 kilowatt. (Sec. 4, 15th regulation, Act of August 13th, 1912.)

6. *Special amateur stations* may be licensed by the Secretary of Commerce to use a longer wave length and a higher power on special application to the Secretary of Commerce. Applications for this class from amateurs with less than two years' experience in actual radio communication will not be approved. The application must state the experience and purpose of the applicant, the local conditions of radio communication, especially of maritime radio communication in the vicinity of the station, and a special licence will be granted only if some substantial benefit to the art or to commerce apart from individual amusement seems probable. (Sec. 4, 15th regulation, Act of August 13th, 1912.)

7. *Restricted amateur stations*, within 5 nautical miles of a naval or military station, are restricted to a wave length not exceeding 200 metres and to a transformer input not exceeding one-half kilowatt. (Sec. 4, 16th regulation, Act of August 13th, 1912.)

8. *Suspension of Service.*—Persons or corporations holding licences for radio stations, either land or ship, should notify the radio inspector for the district whenever the station or vessel goes out of commission for a period exceeding three months. The Commissioner of Navigation should be notified promptly of any intention to suspend or discontinue the service of any commercial station.

If there is no intention to resume the same service, or if the station or vessel will enter a different service from that indicated by the licence, the radio inspector will submit the licence to the bureau, together with a statement of the facts, so that the licence may be amended.

When the station goes into commission, the radio inspector will satisfy himself that the station corresponds to the schedule of the station as shown in the licence.

9. *Special stations for exceptional distances* are land stations designed (coast) to carry on transoceanic radio communication as between the United States and European countries, or between the Pacific

coast and Hawaii, or from the United States over similar long distances at sea to another land station, or (inland) to carry on radio communication overland over exceptional distances. These stations will all come under one of the classifications named above, and the licence will indicate the stations for which communication is authorised and indicate the range.

10. *General Remarks.*—(*a*) General public service, limited public service, limited commercial, special amateur, and special stations which come under the classification of coast stations are subject to the same requirements as to the provision for receiving and relaying distress calls.

(*b*) Stations operated at different portions of the day for different purposes will require licences covering each purpose; that is, a station used during the day for limited commercial purposes and during the night for general public service will require two licences.

Part 2. Licences—Operators.

The third section of the Act prescribes that every radio apparatus required to be licensed shall at all times while in use and operation be in charge or under the supervision of a person or persons licensed for that purpose by the Secretary of Commerce.

Licences approved and issued by the Secretary of Commerce to operators will be delivered to applicants after passing examinations given by the officers named under the head "Examination of operators for licences."

[Note.—*Apprentices.*—Under the supervision of a licensed operator an apprentice or unlicensed person may learn the art by the actual use of the apparatus, but the licensed operator who fails to enforce obedience to the regulations by the apprentice or unlicensed person serving under his supervision is liable to penalties as if he had himself violated the regulations.]

Operators' licences are divided into the following grades:—

I. Commercial:

1. Extra first grade.
2. First grade.
3. Second grade.
4. Cargo grade.
5. Temporary permit.

II Amateur:

6. First grade.
7. Second grade.

III. Technical:

8. Experiment and instruction grade.

The requirements which applicants must meet to secure licences of the several grades and the scope and limitations of employment authorised by the licences of the several grades are as follows:—

I. Commercial.

Extra First Grade.—Special qualifications, for which see page 349.

First grade.—The applicant must pass a satisfactory examination in—

(*a*) The adjustment, operation, and care of the apparatus, including correction of faults and change from one wave length to another.

(*b*) Transmitting and receiving by ear at a speed of not less than 20 words a minute in Continental Morse (five letters, numerals, or other characters to the word).

(*c*) Use and care of storage battery or other auxiliary power apparatus.

(*d*) Knowledge of the international regulations in force applying to radio communication.

(*e*) Knowledge of the requirements of the Acts of Congress to regulate radio communication—sections 3, 4, 5, 6, and 7 of the Act of August 13th, 1912. No stated experience is required, but the examination given is such that a person must be familiar with all parts and principles embodied in a ratio set and auxiliary power apparatus used, to obtain a licence.

(1) The commercial first-grade licence qualifies the operator for employment at any ship or land station of any class and is the highest certificate indicative of ability as radio operator issued at this time.

(2) Every ship station of class A must carry two or more operators, at least one of whom must have a valid commerical first-grade licence, or, in the case of a foreign ship, have an equivalent foreign licence.

[Note.—The requirements for this grade are the same as the international requirements imposed on operators of foreign ships by international regulation, except the knowledge of the use and care of storage battery or other auxiliary and of the Act of August 13th, 1912. Inspectors will allow a reasonable time to foreign operators on foreign ships to meet the additional requirements, supplying them as promptly as practicable with copies of the Act of August 13th, 1912.]

(3) Every ship station of class A on a steamer carrying 100 or more passengers, and under the London Convention vessels having constant service, must carry at least two operators having commercial first-grade licences.

(4) Every land station open to general public service must have at least one commercial first-grade operator.

(5) Every coast station of class 1 must have commercial first-grade operators.

Second grade.—The applicant must pass a satisfactory examination in all the subjects prescribed above for the first grade, with the exception that the minimum speed in transmitting and receiving shall not be less than 12 words a minute in Continental Morse, and the examination in the subjects will not be as comprehensive as that given first-grade operators.

(1) An operator licensed as commercial second-grade, on subsequent compliance with the speed test for the first-grade, and further examination on the subjects named, may have his licence raised to

DR. J. ERSKINE MURRAY, D.SC.

(For whose Biographical Notice see page 879.)

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the first grade by the indorsement in red ink on the face of his licence "Examined on [date] at [place] and passed first grade by [examining officer's signature]," or a first-grade licence may be issued.

(2) Every ship station under class A (except steamers carrying 100 or more passengers) must carry a second operator, having the commercial second-grade licence, or higher.

(3) Every ship station under classes B and C must carry at least one operator licensed as commercial second grade, or higher.

(4) Every coast station of classes 2 and 6 must have at least one operator holding a valid commercial second-grade licence.

Cargo grade.—Section 2 of the Act of July 23rd, 1912, provides:

> On cargo steamers, in lieu of the second operator provided for in this Act, there may be substituted a member of the crew or other person who shall be duly certified and entered in the ship's log as competent to receive and understand distress calls or other usual calls indicating danger, and to aid in maintaining a constant wireless watch so far as required for the safety of life.

The examination will be conducted so as to determine the following facts:

(1) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the distress signal (SOS), when included in a list of other words or signals sent slowly. (Approximately five words a minute.)

(2) That the applicant is sufficiently familiar with the Continental Morse Code to recognise the radio call letters of the vessel on which he desires to operate when sent slowly and repeated several times.

(3) That the applicant is sufficiently familiar with the type of the receiving apparatus of the vessel on which he desires to operate to determine by a buzzer or similar test that the detector or receiving apparatus is properly adjusted to receive signals.

Examining officers and radio inspectors are authorised to issue a certificate, in the form of an amateur first-grade licence, after examination, to indicate the facts above enumerated in the case of a member of the crew or other person, and experience under this form will be credited by examining officers if the holder later applies for examination for a commercial licence. These licences will be marked "Cargo" in the upper right-hand corner under the serial number.

Temporary permit.—Section 3 of the Act of August 13th, 1912, provides:

> In case of emergency the Secretary of Commerce may authorise a collector of customs to issue a temporary permit, in lieu of a licence, to the operator on a vessel subject to the radio ship Act of 1910.

The temporary permit is to be issued only in cases of emergency and will be valid for only one voyage. The collector will report in each case to the Commissioner of Navigation the circumstances which rendered necessary the issue of a temporary permit.

Radio operators holding licences of any grade or class and applying for examination for any other grade or class must submit to the examining officer an additional form, No. 756, in duplicate. If a new licence is issued, the licence held by the applicant must be surrendered.

II. Amateur.

General.—Amateurs, before applying for licences, should read and understand the essential parts of the International Radiotelegraphic Convention in force and sections 3, 4, 5, and 7 of the Act of August 13th, 1912. The Department recognises that radio communication offers a wholesome form of instructive recreation for amateurs. At the same time, its use for this purpose must observe strictly the rights of others to the uninterrupted use of apparatus for important public and commercial purposes. The Department will not knowingly issue a licence to an amateur who does not recognise and will not obey this principle.

First grade.—The applicant must have a sufficient knowledge of the adjustment and operation of the apparatus which he wishes to operate, and of the regulations of the International Convention and Acts of Congress in so far as they relate to interference with other radio communication and impose certain duties on all grades of operators. The applicant must be able to transmit and receive in Continental Morse, at a speed sufficient to enable him to recognise distress calls or the official "keep-out" signals. A speed of at least five words per minute (five letters to the word) must be attained. Applicants for licences of this grade residing at or near any place where examinations are held will communicate with examining officers and will be examined for licences of amateur grades. At places remote from examining officers, applicants will file applications with the radio inspector, who will endeavour to arrange for examinations on his inspection trips.

Second grade.—The requirements for the second grade will be the same as for the first grade. The second-grade licence will be issued only where an applicant cannot be examined or until he can be examined. An examining officer or radio inspector is authorised in his discretion to waive an actual examination of an applicant for an amateur licence, if the amateur for adequate reasons cannot present himself for examination, but in writing can satisfy the examining officer or radio inspector that he is qualified to hold a licence and will conform to its obligations.

III. Technical.

Experiment and instruction grade.—The operator's licence for this grade is a commercial licence, endorsed by the Secretary of Com-

merce, with a statement of the special purposes for which it is valid. It should be forwarded to the Commissioner of Navigation with a recommendation, if practicable, from a radio inspector or examining officer.

Experimenters and instructors of scientific attainments in the art of radio communication, whose knowledge of the radio laws satisfies the radio inspector or the examining officer, may obtain this grade licence, provided they are able to transmit and receive in the Continental Morse Code at a speed sufficient to enable them to recognise distress calls or the "keep-out" signals.

This licence has no reference to the instruction of radio operators as such, but is required by those operating apparatus licensed as experimental stations, but who are unable to obtain commercial-grade operators' licences.

Part 3. Applications for Licences.

Station licences for the use and operation of apparatus for radio communication under the Act may be issued only to citizens of the United States or Porto Rico or to a company incorporated under the laws of some State or Territory or of the United States or Porto Rico.

Licences can be issued to clubs if they are incorporated or if a member will accept the responsibility for the operation of the apparatus, carrying with it the possibility of being penalised for infraction of the laws.

I. Ship Stations.

Applications for licences for ship stations should be addressed to the radio inspector for the district, including the port whence the vessel usually departs.

The application by the company operating the apparatus should state the name of the ship in respect of which the licence is required. The radio inspector will then issue the Department's blank form of application for licence to be filled in by the applicant and returned to the radio inspector with a statement when the ship will be in port and its radio apparatus may be thoroughly inspected.

II. Land Stations.

Coast stations.—The several classes of coast stations will be licensed, for reasons already assigned, in advance of inland stations.

Applications for licences for coast stations should be addressed to the Department's radio inspector for the district in which the station is located, who will forward the application Form 757.

All land stations, except general and restricted amateur stations, should state their location in latitude and longitude to seconds.

The application will state the class of the station for which a licence is desired, with particulars to show its proper classification, approximate transmitting range with a similar station, and precise location (State, county, city, or town, street and number, or, if outside of city or town

limits, as exact a description of its locality as may be). A blank form for apparatus will be sent when Form 757 has been filed, and arrangements made for inspection if necessary. Requests for licences for coast stations will be taken up in the order of classes, as indicated above, and in the order of date received only so far as the relative importance of stations will permit. Amateur applicants who state that they have read the International Radiotelegraphic Convention in force and the Act of August 13, 1912, will receive attention before those who have not.

Inland stations.—The issue of licences to inland stations, as already defined, will be taken up after ship and coast stations. The procedure for application for licence will be the same as for coast stations.

III. Forms.

(*a*) The several forms of applications and licences for operators will be issued through examining officers (through the War and Navy Departments) and radio inspectors. The licences will be numbered serially.

(*b*) The forms and licences for stations and apparatus will be issued through radio inspectors. Licences for general and restricted amateur stations are issued by them direct to applicant. Station licences of all other classes are issued from the office of the Commissioner of Navigation, Department of Commerce.

IV. Commercial Operators.

Applications for operators' licences of the several commercial grades should be addressed to the nearest examining officer or radio inspector, who will arrange for examinations. Where the applicant is not within reasonable distance of an examining officer or radio inspector he may forward his application with a statement of the facts.

Holders of commercial extra first-grade radio operators' licences may be issued renewal of such licences without examination, provided the service records on the backs of the licences properly certify to twelve months' satisfactory service in a land or ship station open to general public service, at least six months of which must have been served during the last twelve months of the licence period.

However, holders of commercial extra first-grade licences now employed as radio inspectors, radio instructors, or similar occupations requiring exceptional qualifications where the duties require the testing, or demonstrating, or otherwise using commercial radio apparatus and the telegraph codes, may be issued renewals of their licences without re-examination, provided, in addition to the above, they can show satisfactory evidence of such service covering a period of eighteen months out of the two-year licence period. Where the applicant has not used regularly the telegraph codes, he will be given the code examination required in the original examination or, if he has used only one code, he will be examined in the code not used.

The service record shown on the licences must be transcribed on Form 756.

The licence may be marked "Expired" in red across the face and returned to the operator, if desired. The action taken should be noted on Form 756.

Where the record on the reverse side of the licence does not show the service performed, the evidence submitted as proof of such service must be transmitted to the Bureau with Form 756.

Transcriptions of code tests must be submitted to the Bureau.

Where applicants are at remote points or can not proceed to examining offices efforts will be made to examine them through radio inspectors when they are in that vicinity, but special trips cannot be made for that purpose.

V. Amateur Operators.

(*a*) Amateurs in the seaboard States should write to the nearest examining officer in their vicinity for Form 756 (application for operator's licence) and to the radio inspector in their vicinity for Form 757 (application for licence for land station). If the application for operator's licence is also made to the radio inspector, both applications should be forwarded in the same envelope.

(*b*) Amateur operators at points remote from examining officers and radio inspectors will be issued second-grade amateur licences without examination, as explained previously. Examinations for first-grade licences will be given by the radio inspector when he is in that vicinity, but special trips can not be made for this purpose.

Part 4. General Observations.

1. An operator's licence may be granted to any person without regard to sex, nationality, or age if the applicant can fulfil the requirements for the class of licence desired.

2. No stated experience is required. The examinations for the different grades are such as require a proper amount of experience to pass.

3. The service regulations of the radiotelegraphic convention in force provides that "no station on shipboard shall be established or worked by private enterprise without authority from the Government to which the vessel is subject." Such authority shall be in the nature of a licence issued by said Government. Stations on foreign ships will be licensed by their Governments, respectively. Inspectors will report to the Commissioner of Navigation stations on foreign ships not so licensed.

4. The lists of call signals when issued by the Department of Commerce may be obtained from the Superintendent of Documents, Government Printing Office, Washington.

5. Operator's licences should be framed and posted in the radio room, and licences for stations should be accessible at all times to inspectors.

6. Operator's licences should indicate on their face that the oath has been executed. This statement should be signed by a notary public.

7. Stations equipped to receive only do not require a licence.

8. No fees are charged for any operator or station licence.

9. Licensed stations require licensed operators.

10. Amateur stations within five miles of naval or military stations need not have been in actual operation on or before August 13th, 1912, to obtain a licence for a restricted amateur station.

11. Any person applying for a duplicate licence to replace an original which has been lost, mutilated, or destroyed, will be required to submit an affidavit to the Bureau of Navigation through the radio inspector or examining officer issuing the original, attesting the facts regarding the manner in which the original was lost, mutilated, or destroyed.

The Commissioner of Navigation will consider the facts in the case and advise the radio inspector or examining officer in regard to the issue of a duplicate licence. A duplicate licence will be issued under the same serial number as the original and marked "Duplicate" in red across the face.

12. These instructions may be amended and supplemented from time to time.

E THE Minister of Marine of the United States of America has notified to the Berne Bureau that the following information is to be published:—

1. The Departments of the United States Government which are concerned with wireless telegraphy regret that they have not yet been able to make arrangements with the land telegraph of the United States owing to the fact that these are in the hands of commercial companies. and have nothing to do with the Government. The idea was to arrange for the free transmission over the land telegraph, in accordance with Article 14, paragraph 2, of the Rules of Service of the London Convention. The information to be transmitted free of charge was all such as related to the date and the hour of the handing in of radiotelegrams on board ship. But the transmission of such information over land lines being subject to a tax, the Government of the United States cannot, at present, conform strictly to this rule of the Convention. The declaration of the American delegation contained in Article 2 of the Final Protocol made provision for such a possible outcome, although its exact nature was not actually set forth.

2. Multiple radiotelegrams, such as are mentioned in Article 38, paragraph 5, of the Rules of Service, will be accepted as multiple messages in all wireless transmission between ship and shore stations, but all the companies operating land telegraph lines in the United States

will consider, and will charge for, a multiple wireless message as consisting of so many individual telegrams as the addresses it bears may indicate.

3. The United States is not a member of the International Telegraphic Union, and consequently is not bound to execute the rules laid down in Article 38, paragraph 8, of the London Convention Rules of Service concerning urgent radiotelegrams. The laws of the United States regulating all reciprocal arrangements between the States forbid the use of the privilege, and consequently all telegraph companies will not allow any priority in favour of telegrams for which any additional tax may have been paid.

URUGUAY

WIRELESS Telegraphy in Uruguay is controlled by the Ministry of War and Marine, and all work in connection with the administration of Wireless Telegraphy and the granting of licences is directed by the Inspector-General for Wireless Telegraphy, Don Bernardo Kayel.

In January, 1912, the Uruguayan Government issued a Decree compelling ships carrying passengers between the harbours of the Republic and those of foreign countries to be fitted with wireless telegraph installations. The carrying out of this Decree is entrusted to the General Inspection of National Services of Wireless Telegraphy :—

1. Commencing from May 1st of the present year (1912) all the ships carrying passengers between the harbours of the Republic and those of foreign countries shall be fitted with radiotelegraph installations.

2. The said installations shall be designed to receive and transmit telegrams up to a distance of not less than one hundred kilometres on the ships of river navigation, and four hundred kilometres on those of the oceanic navigation.

3. The installations shall be permanently kept in good conditions of working, and capable of intercommunicating with the stations of the Republic.

4. The stations shall be in charge of persons well acquainted with the use of radiotelegraph apparatus.

5. The service of the stations shall be entirely in accordance with the provisions of the International Radiotelegraph Convention.

6. The agents of the companies will inform, before expiration of the time fixed, the General Inspector of the National Services of Wireless Telegraphy of the characteristics, system, power, etc., of the radiotelegraph apparatus to be fitted on the ships of their companies.

7. The ships which after expiration of the time fixed by Article 1 have not complied with the provisions of this Decree, shall not be authorised to carry passengers in the harbours of the Republic.

8. Those ships which do not keep their Wireless Apparatus in proper working condition shall be liable to have applied to them the penalty specified in the previous article (7).

9. The General Inspector of the National Service of Wireless Telegraphy is hereby entrusted with seeing that the provisions of this decree are duly complied with.

WIRELESS TELEGRAPH STATIONS OF THE WORLD

A. Land Stations

B. Ship Stations

THE tables of land and ship stations set out in the following pages should be consulted in conjunction with the map of wireless telegraph stations of the world inserted at the end of this book. The stations have been grouped together under the names of the countries to which they are proper, and these countries have been arranged in alphabetical order; therefore no difficulty is likely to be experienced in locating any particular station.

The International Bureau has allotted to signatories of the Convention a list of combinations of letters to be used as call signals for stations proper to the respective countries. The letter-limitations of these lists are shown on page 608 together with the name of the countries with which they are connected.

An alphabetical list of call letters for land and ship stations appears on pages 609 to 652. This list indicates upon which page particulars of any station may be found.

Stations of a private or experimental character are omitted, unless exceptional circumstances warrant their inclusion.

In view of the difficulty of obtaining certain information, and the restrictions placed upon us by the Defence of the Realm Act, it has not been possible fully to correct or bring up to date these lists, although every effort has been made to attain the maximum degree of accuracy possible under the circumstances. No responsibility can be accepted, therefore, in this connection.

A. LAND STATIONS.

The following abbreviations are used in the Table of Land Stations below:—Column 2 (Geographical Position): E—East Longitude; W—West Longitude; N—North Latitude; S—South Latitude. Column 7 (Nature of Service): P G—General Public Correspondence; P R—Restricted Public Correspondence; O—Official Correspondence; P—Private Correspondence. Column 8 (Hours of Service): N—Continuous Service; X—No fixed working hours.

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type)	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
ALASKA	Meridian of Greenwich.							Francs.	Francs.
Akutan	Aleutian Islands. 165° 48′ 00″ W. 54° 08′ 00″ N.	KMW	50	North Pacific Sea Products Co.	300, 525, **600**	—[276]	X	—	—
Alockanok River ..	156° 37′ 50″ W. 59° 05′ 45″ N.	KML	20–30	North Alaska Salmon Co.	300, 500, **600**	P[10]	X	—	—
Anchorage, Alaska ..	Cook Inlet. 149° 50′ 00″ W. 61° 16′ 00″ N.	NZY	150	Alaska Engineering Commission	300, **600**, 750, 1,000	O	X	—	—
Brooks, Alaska[192] ..	149° 30′ 00″ W. 65° 00′ 00″ N.	KIZ	300	Alaska Wireless Telegraph Co.	300, **600**	P R[196] ..	9.30 a.m. to 10 a.m., 1 p.m. to 1.30 p.m., 4 p.m. to 4.30 p.m.	1.00	10.00
Chichagof, Alaska ..	136° 09′ 20″ W. 57° 36′ 30″ N.	KWW	50	Joseph T. Bauer	300, 500, **600**	P[293]	X	—	—
Chignik	Alaska Peninsula 158° 31′ 30″ W. 56° 17′ 30″ N.	KHC	200	Alaska Packers' Association	300, 500, **600**, 1,610	—[276]	X[285]	—	—
Circle City[192 255]	144° 04′ 18″ W. 65° 49′ 12″ N.	WVA	450	U.S. Army ..	**600**, 1,400	O	—	—	—
Clarks Point	Bristol Bay 158° 31′ 30″ W. 58° 50′ 45″ N.	KHG	200	Alaska Packers' Association	300, 400, 500, **600**	P[288]	X[285]	—	—
Cordova, Alaska[256] ..	Prince William Sound 145° 58′ 55″ W. 60° 27′ 45″ N.	NPA	400	U.S. Navy ..	600	P G[160 303] ..	N	0.25[253]	2.50[253]
Dutch Harbor[256] ..	Aleutian Islands, Unalaska 166° 32′ 08″ W. 53° 53′ 14″ N.	NPR	150	U.S. Navy ..	600	P G[160]	N	0.25[253]	2.50[253]
Egegak	157° 39′ 00″ W. 58° 17′ 00″ N.	KMF	100–300	North Alaska Salmon Co.	300, 500, **600**	P[10]	X	—	—
Fairbanks, Alaska[192 255]	147° 42′ 21″ W. 64° 50′ 17″ N.	WVB	200	U.S. Army ..	**600**, 1,400	O	—	—	—
[illegible][192 255]	Eagle 64° 46′ 19″ N.	WVC	200	U.S. Army ..	**600**, 1,400	O	—	—	—
Fort Gibbon, Alaska[192 2..]	Tanana [illegible]	WVD	[illegible]	U.S. Army ..	**1,600**, [illegible]	O			

Hales Creek	156° 37′ 00″ W. 59° 08′ 00″ N.	KMT	500	North Alaska Salmon Co.	300, **600**	P [10]	X	—	—
Holy Cross [255]	—	WVK	—	U.S. Army	—	P G	10 a.m. to 8 p.m.	—	—
Iditarod [192]	158° 00′ 00″ W. 62° 40′ 00″ N.	KIV	200	Alaska Wireless Telegraph Co.	500, 1,650	— [17]	Local time: 9 a.m. to 7 p.m.	—	—
Jualin	135° 00′ 00″ W. 58° 56′ 00″ N.	KJA	100	Jualin Mines Co.	300, 500, **600**, 1,980	P G [181]	Local time: 8.30 a.m. to 8.45 a.m., 1.30 p.m. to 1.45 p.m., 7.30 p.m. to 7.45 p.m.	0.30	3.00
Juneau, Alaska	134° 25′ 00″ W. 58° 19′ 00″ N.	KDU	250–1500	Marconi Co.	300, **600**, 1,800 3,100 [11]	P G [197]	8 a.m. to midnight.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Kensington, Alaska	135° 06′ 54″ W. 58° 52′ 06″ N.	KDN	100–250	Marconi Co.	300, **600**, 1,650	P G [85]	9 a.m. to 9.15 a.m. 1 p.m. to 1.15 p.m. 7 p.m. to 7.15 p.m.	0.30	3.00
Ketchikan	Alexander Archipelago 131° 38′ 51″ W. 55° 20′ 45″ N.	KPB	250–1,500	Marconi Co.	300, **600**, 1,800 3,100 [14]	P G [15]	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
King Cove	—	KJK	—	Pacific - American Fisheries Co.	—	P	—	—	—
Kodiak [256]	Hood Island, near the town of Kodiak 152° 21′ 52″ W. 57° 46′ 42″ N.	NPS	200	U.S. Navy	600	P G [160 303]	N	0.25 [253]	2.50 [253]
Koggiung KHB	Bristol Bay 157° 00′ 00″ W. 59° 02′ 30″ N.	KHB	200	Alaska Packers' Association	300, 400, 500, **600**	P [286]	X [285]	—	—
Koggiung KVV	Bristol Bay 156° 55′ 30″ W. 58° 52′ 30″ N.	KVV	250	Alaska Fishermen's Packing Co.	300, 450, **600**	P G	Local time [287]: 6.30 p.m. to 9.30 p.m.	0.30	3.00
Kotlik [254 255]	Norton Sound 163° 22′ 22″ W. 63° 02′ 30″ N.	WVF	53	U.S. Army	600	P G	Local time: 9 a.m. to 9 p.m. [138]	0.30	3.00
Larsen Bay	Kodiak Island 153° 59′ 40″ W. 57° 37′ 30″ N.	KHA	200	Alaska Packers' Association	300, 500, **600**, 1,610	— [276]	X [285]	—	—
Latouche, Alaska	—	KIM	150	Kennecott Copper Corporation	300, **600**, 1,650	P G [302]	1 p.m. to 5 p.m.	0.30 [158]	3.00 [158]
Metha Nelson [289]	Bristol Bay 158° 28′ 00″ W. 58° 45′ 00″ N.	KMP	20	Alaska Packers' Association	300, 500, **600**	— [290]	X	—	—
Naknek KHT	Bristol Bay 157° 00′ 00″ W. 58° 43′ 30″ N.	KHT	200	Alaska Packers' Association	300, 500, **600**, 1,610	P [286]	X [285]	—	—
Naknek KMK	156° 25′ 00″ W. 58° 43′ 20″ N.	KMK	300	Naknek Packing Co.	300, 500, **600**	P [277]	X	—	—
Nome, Alaska [254 256]	Norton Sound 165° 23′ 38″ W. 64° 30′ 20″ N.	WVG	260	U.S. Army	**600**, 2,000 [190]	P G	N	0.30	3.00

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
ALASKA—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Nulato [192, 255]	158° 06′ 48″ W. 64° 43′ 30″ N.	WVH	950	U.S. Army ..	2,000 [196]	O	—	—	—
Nushagak	Bristol Bay 158° 32′ 00″ W. 58° 42′ 00″ N.	KMG	100–300	North Alaska Salmon Co.	300, 500, **600**	P [10]	X	—	—
Petersburg, Alaska [254, 255]	Alexander Archipelago 133° 57′ 06″ W. 56° 48′ 44″ N.	WVI	40	U.S. Army ..	600	P G	Local time: 9 a.m. to 9 p.m.	0.30	3.00
Port Moller	160° 40′ 00″ W. 59° 50′ 00″ N.	KWR	250	Pacific-American Fisheries	300, 450, **600**, 1,610	P G	Local time: 6.30 p.m. to 9.30 p.m.	0.30	3.00
Port Walter	134° 40′ 00″ W. 56° 20′ 00″ N.	KEQ	100	Alaska Herring & Sardine Co.	300, 525, **600**, 1,625	P G [301] ..	X	0.40	4.00
St. George, Alaska [256] ..	Pribilof Islands 169° 43′ 00″ W. 56° 36′ 00″ N.	NPY	40	U.S. Navy ..	600	O [160]	X	— [253]	— [253]
St. Paul, Alaska [256] ..	Pribilof Islands 170° 16′ 20″ W. 57° 07′ 20″ N.	NPQ	200	U.S. Navy ..	600	P G [160]	N	0.25 [253]	2.50 [253]
Sitka, Alaska [256]	Alexander Archipelago 135° 20′ 55″ W. 57° 02′ 58″ N.	NPB	150	U.S. Navy ..	600	P G [160, 198, 303] ..	N	0.25 [253]	2.50 [253]
Snag Point	Bristol Bay 158° 27′ 15″ W. 59° 02′ 30″ N.	KHF	200	Alaska Packers' Association	300, 400, 500, **600**	P [286]	X [285]	—	—
Teller	—	KWT	—	Max. R. Hirschberg	—	—	—	—	—
Ugashik	157° 35′ 00″ W. 57° 34′ 28″ N.	KMU	50–70	Red Salmon Canning Co.	300, 500, **600**	— [276]	X	—	—
Wrangell [254, 255]	Alexander Archipelago 132° 23′ 12″ W. 56° 28′ 19″ N.	WVJ	40	U.S. Army ..	300, **600**	P G [198] ..	Local time: 9 a.m. to 9 p.m.	0.30	3.00
ARGENTINE (REPUBLIC)							Mean time of the Meridian of Cordoba [4]		
Año Nuevo	Año Nuevo Island 64° 09′ 20″ W. 54° 39′ 30″ S.	LIG	432	Government ..	**600**, 1,800	O	9 a.m. to 11 a.m., 2 p.m. to 4 p.m., 8 p.m. to midnight	—	—
[illegible]	68° 23′ 52″ W. 43° 22′ 06″ S.	[illegible]		Government	300, **600**	P G	N	0.60	6.00

	the port of Buenos Aires 58° 22′ 10″ W. 34° 35′ 00″ S.								
Dársena Sud	South entrance to the port of Buenos Aires 58° 21′ 10″ W. 34° 37′ 54″ S.	LIK	270	Government ..	600	O	X	—	—
Faro Mogotes [205] ..	At the south of the Cap Corrientes 57° 32′ 51″ W. 38° 05′ 30″ S.	LIC	270	Government ..	300, **600**	P G	N	0.60	6.00
Faro Recalada [205] ..	Rio de la Plata 56° 18′ 30″ W. 35° 10′ 30″ S.	LID	216	Government ..	300, **600**	P G	9 a.m. to 11 a.m., 2 p.m. to 4 p.m., 8 p.m. to midnight	0.60	6.00
Formosa, Argentina [192] ..	Government of Formosa 58° 12′ 00″ W. 26° 16′ 00″ S.	LIJ	270	Government ..	450, **600**	O	May 1st to September 30th, 7 a.m. to 9 a.m., 8 p.m. to 11 p.m. October 1st to April 30th, 6 a.m. to 8 a.m., 8 p.m. to 11 p.m.	—	—
Paz, Entre Rios (La) [192] ..	Province of Entre Rios 59° 38′ 00″ W. 30° 42′ 00″ S.	LII	270	Government ..	450, **600**	O	May 1st to September 30th, 7 a.m. to 9 a.m., 8 p.m. to 11 p.m. October 1st to April 30th, 6 a.m. to 8 a.m., 8 p.m. to 11 p.m.	—	—
Posadas, Misiones [192] ..	55° 54′ 00″ W. 27° 22′ 00″ S.	LIQ	270	Government ..	300, **600**	P G	May 1st to September 30th, 7 a.m., to 9 a.m., 8 p.m., to 11 p.m. October 1st to April 30th, 6 a.m. to 8 a.m., 8 p.m. to 11 p.m.	—	—
Puerto Aguirre [192] ..	Rio Iguazú 54° 34′ 00″ W. 25° 35′ 00″ S.	LIR	270	Government ..	300, **600**	P G	May 1st to September 30th, 7 a.m. to 9 a.m., 8 p.m. to 11 p.m. October 1st to April 30th, 6 a.m. to 8 a.m., 8 p.m. to 11 p.m.	—	—
Puerto Militar	Near Bahia Blanca 62° 06′ 02″ W. 38° 53′ 30″ S.	LIE	270	Government ..	300, **600**	P G	N	0.60	6.00

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge
ARGENTINE (REPUBLIC) —*contd.*									
Rio Grande, Tierra del Fuego	Meridian of Greenwich. Tierra del Fuego 67° 46′ 00″ W. 53° 46′ 30″ S.	LIS	270	Government ..	300, **600**	P G	Mean time of the Meridian of Cordoba [4]. 9 a.m. to 11 a.m., 2 p.m. to 4 p.m., 8 p.m. to midnight	Francs. 0.60	Francs. 6.00
Rio Santiago, Buenos Aires	Near Buenos Aires 57° 51′ 53″ W. 34° 50′ 57″ S.	LIB	270	Government ..	600	O	9 a.m. to 11 a.m., 2 p.m. to 4 p.m., 8 p.m. to midnight	—	—
Ushuaia	Tierra del Fuego 68° 20′ 00″ W. 54° 48′ 50″ S.	LIH	324	Government ..	300, **600**	P G	9 a.m. to 11 a.m., 2 p.m. to 4 p.m., 8 p.m. to midnight	0.60	6.00
AUSTRALIAN COMMONWEALTH									
Adelaide Radio	South Australia 138° 31′ 00″ E. 34° 52′ 00″ S.	VIA	450	Government ..	300, 450, **600**	P G [1]	Mean time of the meridian 142° 30′ east of Greenwich: 6 a.m. to 1 a.m.	0.30 [247] [248] 0.60 [248] [249]	— —
Brisbane Radio	Queensland 153° 01′ 45″ E. 27° 25′ 30″ S.	VIB	450	Government ..	300, 450, **600**	P G [1]	N	0.30 [247] [248] 0.60 [248] [249]	— —
Broome Radio	Western Australia 122° 12′ 00″ E. 18° 00′ 00″ S.	VIO	450	Government ..	300, 450, **600**	P G [250]	N	0.30 [247] [248] 0.60 [248] [249]	— —
Cooktown Radio ..	Queensland 145° 15′ 30″ E. 15° 27′ 45″ S.	VIC	450	Government ..	300, 450, **600**	P G [250] ..	Mean time of the meridian 150° east of Greenwich: 6 a.m. to 1 a.m.	0.30 [247] [248] 0.60 [248] [249]	— —
Darwin Radio	Northern Territory 130° 48′ 30″ E. 12° 27′ 30″ S.	VID	450	Government ..	300, 450, **600**	P G [250]	N	0.30 [247] [248] 0.60 [248] [249]	— —
Esperance Radio ..	Western Australia [illegible]	VIE	450	Government ..	300, 450, **600**	P G [250]	Mean time of the meridian 120° east of Greenwich: 6	0.30 [247] [248] 0.60 [248]	— —

							closed.	[249]	
Geraldton Radio	Western Australia 114° 35′ 00″ E. 28° 46′ 00″ S.	VIN	450	Government ..	300, 450, **600**	P G [250] ..	Mean time of the meridian 120° east of Greenwich, 9 a.m. to 11 p.m.	0.30 [247] [248] 0.60 [248] [249]	— —
Hobart Radio	Tasmania (Queen's Domain) 147° 19′ 30″ E. 42° 51′ 45″ S.	VIH	300	Government ..	300, 450, **600**	P G [1]	Mean time of the meridian 150° east of Greenwich, 9 a.m. to 11 p.m.	0.30 [247] [248] 0.60 [248] [249]	— —
King Island	N.W. of Tasmania	—	—	Government ..	—	P G [300] (*d*) ..	—	—	—
Macquarie Island Radio..	158° 57′ 00″ E. 54° 31′ 00″ S.	VIQ	300	—	300, 450, **600**	P G [300] (*c*) ..	Mean time of the meridian 150° east of Greenwich, 6 p.m. to midnight.	0.30 [3](*a*) [247] [248] 0.60 [3](*a*) [248] [249]	— —
Melbourne Radio.. ..	Victoria 144° 58′ 30″ E. 37° 50′ 00″ S.	VIM	450	Government ..	300, 450, **600**	P G [1] [2].. ..	N	0.30 [247] [248] 0.60 [248] [249]	— —
Mount Gambier Radio ..	South Australia 140° 49′ 00″ E. 37° 50′ 00″ S.	VIY	400	Government ..	300, 450, **600**	P G [250].. ..	Mean time of the meridian 142° 30′ east of Greenwich, Weekdays, 9 a.m. to 6 p.m.; Sundays no service	0.30 [247] [248] 0.60 [248] [249]	— —
Perth Radio	Western Australia 115° 52′ 00″ E. 32° 01′ 00″ S.	VIP	400 [234] 1,250 [246]	Government ..	300, 450, **600**, 2,500	P G [250].. ..	N	0.30 [247] [248] 0.60 [248] [249]	— —
Rockhampton Radio ..	Queensland 150° 33′ 00″ E. 23° 23′ 45″ S.	VIR	450	Government ..	300, 450, **600**	P G [250].. ..	Mean time of the meridian 150° east of Greenwich, 6 a.m. to 8 p.m.	0.30 [247] [248] 0.60 [248] [249]	— —
Roebourne Radio ..	Western Australia 117° 12′ 15″ E. 20° 44′ 15″ S.	VIZ	450	Government ..	300, 450, **600**	P G [250].. ..	Mean time of the meridian 120° east of Greenwich, 6 a.m. to 8 p.m.	0.30 [247] [248] 0.60 [248] [249]	— —
Sydney Radio	New South Wales 151° 00′ 00″ E. 33° 40′ 00″ S.	VIS	400 [234] 1,250 [246]	Government ..	300, 450, **600**, 2,500	P G [1]	Mean time of the meridian 150° east of Greenwich, 7 a.m. to 2 a.m.	0.30 [247] [248] 0.60 [248] [249]	— —
Thursday Island Radio ..	Queensland, Torres Strait 142° 12′ 45″ E. 10° 35′ 15″ S.	VII	500	Government ..	300, 450, **600**	P G [250].. ..	N	0.30 [247] [248] 0.60 [248] [249]	— —

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
AUSTRALIAN COMMONWEALTH—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Townsville Radio ..	Queensland 146° 50′ 00″ E. 19° 15′ 30″ S.	VIT	450	Government ..	300, 450, **600**	P G [250]	N	0.30 [247, 248] 0.60 [248, 249]	— —
Woodlark Island	Off New Guinea	—	—	Government ..	—	P G [300 (m)] ..	—	—	—
Wyndham Radio	Western Australia 128° 18′ 00″ E. 15° 35′ 00″ S.	VIW	450	Government ..	300, 450, **600**	P G [250]	Mean time of the meridian 120° east of Greenwich, 6 a.m. to 8 p.m.	0.30 [247, 248] 0.60 [248, 249]	— —
AUSTRIA-HUNGARY									
Castelnuovo di Cattaro ..	Adriatic coast Mouths of Cattaro 18° 32′ 04″ E. 42° 27′ 00″ N.	OHC	By day, 250; by night, 500	Government ..	**600**, 1,800 [9]	P G [16]	N	0.20	2.00
Pola	13° 50′ 08″ E. 44° 51′ 08″ N.	OHP	By day, 250; by night, 500	Government ..	600	O	N	—	—
Sebenico	Adriatic coast 15° 53′ 03″ E. 43° 44′ 02″ N.	OHB	By day, 250; by night, 500	Government ..	**600**, 1,800 [9]	P G [16]	N	0.20	2.00
Triest	13° 45′ 30″ E. 45° 38′ 54″ N.	OHT	By day, 150; by night, 300	Government (Imperial Inspectorate of the Radio-Telegraph Service, Triest)	300, **600**	P G [16]	N	0.20	2.00
BAHAMAS									
Nassau, Bahamas ..	77° 22′ 00″ W. 25° 04′ 00″ N.	VPN	400	Government ..	**600**, 1,800	P G [32]	Mean time of the meridian 75° west of Greenwich, 7 a.m. to 3 p.m.	0.30[3](j)	3.00[3](j)
BELGIAN CONGO									
[illegible]	Lower Congo	ONA	400–1,000	Congo State ..	**300**, 600	P G	Greenwich Time, 7 a.m. to 11.30 a.m., [illegible]	0.30	—

							7 a.m. to 10.30 a.m. 4 p.m. to 5 p.m.		
Basoko [192]	Aruwimi 23° 36′ 00″ E. 1° 14′ 00″ N.	OQO	300	Congo State ..	**900**, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Boma [192]	Lower Congo 13° 06′ 00″ E. 5° 51′ 00″ S.	OQB	300	Congo State ..	**900**, 1,200	— [6 7]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Coquilhatville [192]	Equateur 18° 18′ 00″ E. 0° 04′ 00″ N.	OQC	300	Congo State ..	**900**, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Elisabethville [192]	Upper Luapula 27° 31′ 00″ E. 11° 38′ 00″ S.	OQH	300	Congo State ..	900, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Kabalo [192]	Tanganika Moero 27° 00′ 00″ E. 6° 07′ 00″ S.	OQA	100	Congo State ..	600, 900	— [6]	—	—	—
Kikondja [192]	Tanganika Moero 26° 25′ 00″ E. 8° 15′ 00″ S.	OQK	300	Congo State ..	900, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Kindu [192]	Maniema 25° 56′ 00″ E. 2° 56′ 00″ S.	OQD	300	Congo State ..	**900**, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Kinshasa [192]	Middle Congo 15° 21′ 57″ E. 4° 18′ 22″ S.	OQL	300	Congo State ..	3,800	— [6]	7 a.m. to 11.30 a.m., 4 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.*	Coast Charge. Minimum Charge.
BELGIAN CONGO—*contd.*	Meridian of Greenwich.						Greenwich time	Francs.	Francs.
Kongolo [192]	Tanganika, Moero 26° 59′ 00″ E. 5° 23′ 00″ S.	OQG	300	Congo State	**900**, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Lusambo [192]	Sankuru 23° 05′ 00″ E. 5° 00′ 00″ S.	OQM	300	Congo State	**900**, 1,200	— [6]	—	—	—
Stanleyville [192]	Stanleyville 25° 14′ 00″ E. 0° 30′ 00″ N.	OQS	300	Congo State	**900**, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
Umangi [192]	Bangala 21° 26′ 52″ E 2° 06′ 43″ N.	OQI	300	Congo State	**900**, 1,200	— [6]	7 a.m. to 11.30 a.m., 2 p.m. to 5 p.m. Sundays and bank holidays: 7 a.m. to 10.30 a.m., 4 p.m. to 5 p.m.	—	—
BELGIUM									
Nieuport	North Sea coast 2° 43′ 15″ E. 51° 09′ 10″ N.	OST	By day, 220; by night, 540	Government	300, **600**	P G [73]	N	0.20 [8]	2.00 [8]
BERMUDA									
Bermuda	64° 45′ 00″ W. 32° 20′ 00″ N.	BZB	—	Government	—	O	—	—	—
BOLIVIA									
Cobija [192]	—	—	—	Government	—	—	—	—	—
Jacuiba [192]	—	—	—	Government	—	—	—	—	—
Riberalta [192]	—	—	—	Government	—	—	—	—	—
Viacha [192]	—	—	—	Government	—	—	—	—	—
BRAZIL									
[illegible]	[illegible] 17° 57′ 30″ S.	[illegible]	[illegible]	Navy	300	O [262]	—	0.60	—

Anhatomirim	S. Catharina 48° 34′ 20″ W. 27° 25′ 32″ S.	SOI	600	Navy	600, 1,200, 2,000	O [262]	—	0.60	—
Babylonia..	Rio de Janeiro 43° 10′ 10″ W. 22° 55′ 40″ S.	SPY	200	Government ..	300, 600	P G [244]	N	0.60[3] (*d*)	6.00[3] (*d*)
Belém, Pará	48° 30′ 06″ W. 1° 26′ 59″ S	SPB	750	Government ..	300, 600, 1,800	P G	N	0.60	6.00
Cabo de São Thomé ..	Rio de Janeiro (State) 40° 58′ 35″ W. 22° 02′ 00″ S.	SPT	750	Government ..	300, 600	P G [244] ..	N	0.60[3] (*e*)	6.00[3] (*e*)
Cruzeiro do Sul [192] ..	District of Acre 72° 36′ 15″ W. 7° 38′ 28″ S.	SQC	400	Government ..	600, 3,000	—	Fifth time-belt west of the Greenwch belt: 6 p.m. to 6 a.m.	—	—
Fernando de Noronha ..	32° 25′ 12″ W. 3° 50′ 30″ S.	SPN	1,000	Government ..	300, 600, 1,800	P G [244]	N	0.60[3] (*f*)	6.00[3] (*f*)
Ilha das Cobras	Rio de Janeiro Bay 43° 09′ 00″ W. 22° 52′ 00″ S.	SNI	150	Navy	600	O [262]	—	0.60	—
Ilha do Governador ..	Rio de Janeiro Bay 43° 07′ 58″ W. 22° 49′ 25″ S.	SOH	800	Navy	600, 1,200 2,000	O [262]	—	0.60	—
Ilha Raza	Entrance of the Bay of Rio de Janeiro 43° 08′ 45″ W. 23° 03′ 40″ S.	SNZ	150	Navy	600	O [262]	—	0.60	—
Juncção	Rio Grande do Sul 52° 07′ 00″ W. 32° 04′ 00″ S.	SPJ	750	Government ..	300. 600	P G [244]	N	0.60[3] (*g*)	6.00[3] (*g*)
Ladario [13]	—	—	—	Government ..	—	—	—	—	—
Lagôa	S. Catharina 48° 20′ 00″ W. 27° 35′ 00″ S.	SPL	400	Government ..	300, 600	P G [244]	Third time-belt west of the Greenwich belt: 6 a.m. to midnight	0.60[3] (*m*)	6.00[3] (*m*)
Manáos [192]	Amazonas 60° 01′ 45″ W. 3° 08′ 05″ S.	SQM	750	Madeira-Mamoré Railway Co.	2,400, 3,500	—[6]	N	—	—
Mont' Serrat	Near Santos 46° 19′ 34″ W. 23° 56′ 27″ S.	SPS	200	Government ..	300, 600	P G [244]	Third time-belt west of the Greenwich belt: 6 a.m. to midnight	0.60[3] (*h*)	6.00[3] (*h*)
Olinda, Pernambuco ..	Near Pernambuco 34° 51′ 00″ W. 8° 00′ 35″ S.	SPO	590	Government ..	300, 600	P G [244]	N	0.60[3] (*i*)	6.00[3] (*i*)
Porto Velho [192]	Matto Grosso 63° 55′ 00″ W. 8° 46′ 00″ S.	SQV	750	Madeira-Mamoré Railway Co.	2,400, 3,500	—[6]	N	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
BRAZIL—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Puerto Suarez [13]	—	—	—	Government	—	—	—	—	—
Rio Braneo [192]	District of Acre 67° 52′ 05″ W. 9° 58′ 28″ S.	SQR	210	—	1,000, 2,000	—[6]	Fifth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
Santarém, Pará [192]	54° 42′ 58″ W. 2° 24′ 48″ S.	SQS	400	—	**600**, 2,000	—[6]	Fourth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
Senna Madureira [192]	District of Acre 68° 39′ 35″ W. 9° 03′ 57″ S.	SQN	400	—	1,500, 3,000	—[6]	N	—	—
Tarauacá [192]	District of Acre 70° 43′ 30″ W. 8° 20′ 55″ S.	SQT	210	—	1,500 3,000	—[6]	Fifth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
Xapury [192]	District of Acre 68° 36′ 30″ W. 10° 39′ 10″ S.	SQX	210	—	1,000, 2,000	—[6]	Fifth time-belt west of the Greenwich belt: 6 p.m. to 6 a.m.	—	—
BRITISH GUIANA									
Demerara	58° 11′ 00″ W. 6° 49′ 24″ N.	VPA	430	Government	600	—[20]	Local time: 8 a.m. to mid-day, 2 p.m. to 5 p.m.	—	—
BRITISH INDIA									
Allahabad [192]	81° 55′ 00″ E. 25° 26′ 00″ N.	—	—	Government	—	—	—	—	—
Bombay Radio	72° 54′ 00″ E. 18° 55′ 00″ N.	VWB	300	Government	300, **600**	P G [23, 25]	N	0.35	—
Calcutta Radio	88° 25′ 00″ E. 22° 35′ 00″ N.	VWC	300	Government	300, **600**	P G [23, 24]	N	0.35	—
Delhi [192]	77° 00′ 00″ E. 28° 44′ 00″ N.	—	—	Government	—	—	—	—	—
Diamond Island	Mouths of the Irawadi [illegible]	VTD	300	Government	300, **600**	P G [23]	N	0.35	—

	67° 00′ 00″ E. 24° 50′ 00″ N.								
Lahore [192]	—	—	—	Government ..	—	—	—	—	—
Madras Radio	80° 17′ 16″ E. 13° 05′ 00″ N.	VWM	300	Government ..	300, **600**	P G [25]	N	0.35	—
Nagpur [192]	—	—	—	Government ..	—	—	—	—	—
Peshawar [192]	—	—	—	Government ..	—	—	—	—	—
Port Blair	South Andaman Island 92° 45′ 00″ E. 11° 41′ 00″ N.	VTP	300	Government ..	400, **800**	P G [25]	N	0.35	—
Quetta [192]	—	—	—	Government ..	—	—	—	—	—
Rangoon Radio	Lower Burma 96° 07′ 00″ E. 16° 47′ 00″ N.	VTR	300	Government ..	300, **600**	P G [24]	N	0.35	—
Sandheads	At the south of the Ganges Delta 88° 09′ 00″ E. 21° 00′ 00″ N.	VWS	200	Government ..	300, **600**	P G [23]	Mean time of the meridian 82° 30′ east of Greenwich [27]: 6.36 a.m. to 6.36 p.m.	0.35	—
Secunderabad [192] ..	—	—	—	Government ..	—	—	—	—	—
Simla [192]	77° 11′ 00″ E. 31° 06′ 00″ N.	—	—	Government ..	—	—	—	—	—
Victoria Point	Extreme south of Lower Burma 98° 32′ 30″ E. 9° 59′ 00″ N.	VTV	300	Government ..	300, **600**, 700	P G [23] ..	N	0.35	—
BRITISH NEW GUINEA									
Madang	—	—	—	Australian Government	—	P G [300] (*f*) ..	—	—	—
Port Moresby Radio ..	147° 09′ 30″ 9° 28′ 30″	VIG	500	Australian Government	300, 450, **600**	P G [250 800] (*j*) ..	N	0.30 [3] (*b*) [247] [248] 0.60 [3] (*b*) [248] [249]	—
BRITISH SOMALILAND									
Aden Radio	Arabia 45° 03′ 00″ E. 12° 46′ 00″ N.	**VPI**	**250**	**Colonial Office** ..	600	**P G** [28]	**Time of the Meridian of Aden, 3 hours in advance of Greenwich time** N	**0.60**	—
Berbera Radio	45° 01′ 30″ E. 10° 26′ 00″ N.	**VPJ**	**250**	**Colonial Office** ..	300, **600**	**P G** [29]	**6 a.m. to 6 p.m. 8 p.m. to 8.30 p.m.**	**0.60** [30]	—
Bulhar	—	—	—	**Colonial Office** ..	—	—	—	—	—
BRITISH WEST INDIES									
Jamaica (Bowden) ..	76° 19′ 00″ W. 17° 53′ 00″ N.	VPH	200	Direct West India Cable Co.	300, **600**	P G	Local time [31]: 7 a.m. to 7 p.m.	0.60	6.00

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
BRITISH WEST INDIES —*contd.*								Francs.	Francs.
Tobago	Meridian of Greenwich. 60° 40′ 00″ W. 11° 12′ 00″ N.	VPM	250	Government	**600**	P G [20]	Local time: 8 a.m. to 5 p.m. Sundays and public holidays: 8 a.m. to midday.	0.60 [3](*k*) [33]	—
Trinidad	61° 30′ 00″ W. 10° 40′ 00″ N.	VPL	400	Government	**600**	P G [34]	Local time: 8 a.m. to 10 p.m.	0.60 [3](*k*) [33]	—
BULGARIA									
Varna	27° 55′ 00″ E. 43° 12′ 00″ N.	LZF	270	Government	300, **600**	P G	Eastern European time.[59] 9 a.m. to midday, 2 p.m. to 6 p.m.	0.30	3.00
CANADA AND NEWFOUNDLAND									
Alert Bay	British Columbia, Queen Charlotte Sound, Cormorant Island 126° 55′ 36″ W. 50° 35′ 20″ N.	VAF	350	Government, Naval	300, **600**, 1,600	P G [46]	N	0.60 [39 41]	6.00 [39 41]
American Tickle	Labrador 53° 28′ 00″ W. 55° 41′ 00″ N.	VOC	100	Marconi Co.	**600**	— [6]	8 a.m. to 8 p.m. [45 125]	0.60	6.00
Battle Harbour	Labrador 55° 36′ 00″ W. 52° 17′ 00″ N.	VOA	150	Marconi Co.	**300**, 600	— [6]	8 a.m. to 8 p.m. [45 125]	0.60	6.00
Belle Isle	To the north of Newfoundland 55° 21′ 49″ W. 51° 52′ 53″ N.	VCM	250	Marconi Co.	300, **600**	P G [46]	N	0.30 [35]	3.00 [35]
Camperdown, Nova Scotia	Halifax 63° 37′ 07″ W. 44° 31′ 11″ N.	VCS	250	Marconi Co.	300, **600**	P G [37 46]	N	0.30 [35 37]	3.00 [35 37]
Cape Bear	Prince Edward Island 62° 27′ 15″ W. 46° 00′ 45″ N.	VCP	150	Marconi Co.	300, **600**	P G [46]	December-March N April-November, 8 a.m. to 8 p.m. [45]	0.15 [35]	1.50 [35]
[illegible]	Labrador 54° 52′ 00″ N.	VOH	150	Marconi Co.	**600**	— [6]	8 a.m. to 8 p.m. [45 125]	0.60	6.00

	124° 52′ 43″ W. 49° 42′ 20″ N.								
Cape Race..	Newfoundland 53° 04′ 17″ W. 46° 39′ 24″ N.	VCE	500	Marconi Co. ..	300, 600, 1,600	P G [46]	N	0.85 [35]	8.50 [35]
Cape Ray	Newfoundland 59° 18′ 00″ W. 47° 37′ 00″ N.	VCR	350	Marconi Co. ..	300, 600, 1,600	P G [46]	N	0.30 [35]	3.00 [35]
Cape Sable	Nova Scotia 65° 37′ 15″ W. 43° 23′ 19″ N.	VCU	250	Marconi Co. ..	300, 600	P G [37 46] ..	N	0.85 [35 37]	8.50 [35 37]
Clarke City	Province of Quebec, North shore of River St. Lawrence 66° 37′ 17″ W. 50° 11′ 00″ N.	VCK	250	Marconi Co. ..	300, 600	P G [46]	N [42]	0.30 [35]	3.00 [35]
Dead Tree Point ..	British Columbia, Queen Charlotte Islands, Graham Island 131° 55′ 55″ W. 53° 21′ 30″ N.	VAH	200	Government, Naval	300, 600	P G [46]	8 a.m. to 6 p.m. [44]	0.60 [39 41]	6.00 [39 41]
Digby Island	British Columbia, Prince Rupert 130° 22′ 33″ W. 54° 17′ 02″ N.	VAJ	250	Government, Naval.	300, 600	P G [46]	N	0.60 [39 41]	6.00 [39 41]
Domino	Labrador 55° 44′ 00″ W. 52° 28′ 00″ N.	VOD	150	Marconi Co. ..	600	— [6] ..	8 a.m. to 8 p.m. [45 125]	0.60	6.00
Estevan, British Columbia	West Coast of Vancouver Island 126° 32′ 22″ W. 49° 22′ 05″ N.	VAE	500	Government, Naval	300, 600	P G [46] ..	N	0.60 [39 41]	6.00 [39 41]
Fame Point	Gulf of St. Lawrence 64° 36′ 20″ W. 49° 06′ 48″ N.	VCG	250	Marconi Co. ..	300, 600	P G [46] ..	N [42]	0.30 [35]	3.00 [35]
Father Point	River St. Lawrence 68° 27′ 40″ W. 48° 31′ 30″ N.	VCF	350	Marconi Co. ..	300, 600	P G [46] ..	N [42]	0.15 [35]	1.50 [35]
Fogo	Fogo Island 53° 57′ 00″ W. 49° 40′ 00″ N.	VOJ	250	Marconi Co. ..	300, 600	— [6] ..	8 a.m. to 8 p.m. [45]	0.85	8.50
Glace Bay	Nova Scotia 59° 55′ 00″ W. 46° 08′ 00″ N.	—	3,125	Marconi Co. ..	9,000	Transatlantic service	N	—	—
Gonzales Hill	British Columbia, Victoria 123° 19′ 23″ W. 48° 24′ 50″ N.	VAK	250	Government, Naval.	300, 600	P G [46] ..	N	0.60 [39 40 41]	6.00 [39 40 41]

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
CANADA AND NEWFOUNDLAND—*cont.*	Meridian of Greenwich.							Francs.	Francs.
Grady, Labrador ..	56° 23′ 00″ W. 53° 48′ 00″ N.	VOE	150	Marconi Co. ..	**600**	—[6] ..	8 a.m. to 8 p.m.[45 125]	0.60	6.00
Grindstone Island ..	Gulf of St. Lawrence, Magdalen Islands 61° 54′ 20″ W. 47° 23′ 00″ N.	VCN	200	Marconi Co. ..	300, **600**	P G[46]	8 a.m. to 6 p.m.[45]	0.30[35]	3.00[35]
Grosse Isle, Quebec ..	River St. Lawrence 70° 40′ 05″ W. 47° 02′ 00″ N.	VCD	100	Marconi Co. ..	300, **600**	P G[46]	N	0.15[35]	1.50[35]
Halifax Dockyard ..	Nova Scotia 63° 35′ 10″ W. 44° 39′ 30″ N.	VAA	—	Government ..	—	O	—	—	—
Harrington, Quebec ..	Gulf of St. Lawrence 59° 27′ 45″ W. 50° 29′ 39″ N.	VCJ	150	Marconi Co. ..	**300**, 600	P G[46]	N[42]	0.30[35]	3.00[35]
Heath Point	Gulf of St. Lawrence Anticosti Island 61° 42′ 16″ W. 49° 05′ 20″ N.	VCI	250	Marconi Co. ..	300, **600**	P G[46]	N[43]	0.30[35]	3.00[35]
Holton, Labrador ..	57° 15′ 00″ W. 54° 35′ 00″ N.	VOG	150	Marconi Co. ..	**600**	—[6] ..	8 a.m. to 8 p.m.[45 125]	0.60	6.00
Ikeda Head	British Columbia, Queen Charlotte Islands, Moresby Island 131° 07′ 34″ W. 52° 17′ 11″ N.	VAI	250	Government, Naval	300, **600**	P G[46]	8 a.m. to midnight[44]	0.60[39 41]	6.00[39 41]
Kingston, Ontario ..	Barriefield Common 76° 27′ 30″ W. 44° 14′ 04″ N.	VBH	350	Marconi Co. ..	300, **600**, 1,600	P G[46]	N	0.15[35]	1.50[35]
Le Pas, Manitoba ..	101° 21′ 30″ W. 53° 52′ 45″ N.	VBM	600	Government ..	900, **1,800** 2,400	O[153] .. .	X	—	—
Lurcher Lightship ..	Nova Scotia off Lurcher Shoal [illegible]	VDR	100	Department of Marine ..	**300**	O ..	X	—	—

Midland, Ontario	Georgian Bay 79° 51′ 35″ W. 44° 44′ 20″ N.	VBC	350	Marconi Co.	300, **600**, 1,600	P G [46]	N	0.15 [35]	1.50 [35]
Montreal	Province of Quebec 73° 31′ 46″ W. 45° 32′ 43″ N.	VCA	350	Marconi Co.	300, **600**	P G [46]	N [42]	0.15 [3]	1.50 [35]
North Sydney, Nova Scotia	Cape Breton Island 60° 14′ 33″ W. 46° 13′ 29″ N.	VCO	100	Marconi Co.	300, **600**	P G [46]	N	0.30 [35]	3.00 [35]
Pachena	West Coast of Vancouver Island 125° 06′ 20″ W. 48° 43′ 40″ N.	VAD	500	Government, Naval	300, **600**	P G [46]	N	0.60 [39 41]	6.00 [39 41]
Partridge Island	New Brunswick, St. John 66° 03′ 05″ W. 45° 14′ 03″ N.	VCV	250	Marconi Co.	300, **600**	P G [46]	N	0.30 [35]	3.00 [35]
Pictou, Nova Scotia	Northumberland Strait 62° 42′ 21″ W. 45° 41′ 01″ N.	VCQ	100	Marconi Co.	300, **600**	P G [46]	Dec. to April: N May to Nov.: —	0.15 [35]	1.50 [35]
Point Amour	Labrador, Strait of Belle Isle 56° 50′ 28″ W. 51° 27′ 26″ N.	VCL	150	Marconi Co.	**300**, 600	P G [46]	N	0.30 [35]	3.00 [35]
Point Edward	Ontario, to the south of Lake Huron 82° 24′ 53″ W. 43° 00′ 09″ N.	VBE	350	Marconi Co.	300, **600**, 1,600	P G [46]	N	0.15 [35]	1.50 [35]
Point Grey	British Columbia, near Vancouver 123° 15′ 22″ W. 49° 15′ 57″ N.	VAB	150	Government, Naval	300, **600**	P G [46]	N	0.60 [39 40 41]	6.00 [39 40 41]
Point Riche	Newfoundland, Strait of Belle Isle 57° 24′ 30″ W. 50° 42′ 00″ N.	VCH	250	Marconi Co.	300, **600**	P G [46]	N [42]	0.30 [35]	3.00 [35]
Port Arthur, Ontario	Lake Superior Thunder Bay 89° 13′ 45″ W. 48° 26′ 49″ N.	VBA	350	Marconi Co.	300, **600**, 1,600	P G [46 96]	N	0.15 [35]	1.50 [35]
Port Burwell	Ontario, Lake Erie 80° 47′ 14″ W. 42° 38′ 35″ N.	VBF	350	Marconi Co.	300, **600**, 1,600	P G [46]	N	0.15 [35]	1.50 [35]
Port Colbourn	—	—	—	—	—	—	—	—	—
Port Nelson, Manitoba	Hudson Bay, mouth of Nelson River 92° 44′ 27″ W. 57° 03′ 19″ N.	VBN	150 600 [142]	Government	300, **600**, 1,800	P G	N	0.60	6.00

Land Stations—*Continued.*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
CANADA AND NEWFOUNDLAND—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Quebec	71° 12′ 26″ W. 46° 48′ 24″ N.	VCC	100	Marconi Co. ..	300, **600**	P G [46]	N	0.15 [35]	1.50 [35]
Sable Island	Nova Scotia 60° 19′ 00″ W. 43° 56′ 18″ N.	VCT	300	Marconi Co. ..	300, **600**	P G [37 46] ..	N	0.85 [35 37]	8.50 [35 37]
Sault Ste. Marie, Ontario	84° 17′ 50″ W. 46° 31′ 05″ N.	VBB	350	Marconi Co. ..	300, **600**, 1,600	P G [46] .. .	N	0.15 [35]	1.50 [35]
Smokey Tickle	Labrador 57° 11′ 00″ W. 54° 26′ 00″ N.	VOF	150	Marconi Co. ..	600	— [6] ..	8 a.m. to 8 p.m. [45 125]	0.60	6.00
Three Rivers, Quebec ..	River St. Lawrence 72° 33′ 25″ W. 46° 20′ 45″ N.	VCB	150	Marconi Co. ..	300, **600**	P G [46]	N [42]	0.15 [35]	1.50 [35]
Tobermory, Ontario ..	Entrance of Georgian Bay 81° 39′ 40″ W. 45° 15′ 57″ N.	VBD	350	Marconi Co. ..	300, **600**, 1,600	P G [46]	N	0.15 [35]	1.50 [35]
Toronto VBG	Lake Ontario, Toronto Island 79° 22′ 53″ W. 43° 36′ 50″ N.	VBG	350	Marconi Co. ..	300, **600**, 1,600	P G [46]	N	0.15 [35]	1.50 [35]
Triangle Island	British Columbia south of Hecate Strait 129° 04′ 50″ W. 50° 51′ 48″ N.	VAG	450	Government, Naval	300, **600**	P G [46]	N	0.60 [39 41]	6.00 [39 41]
Venison Island	Labrador 53° 14′ 00″ W. 55° 46′ 00″ N.	VOB	100	Marconi Co. ..	600	— [6] ..	8 a.m. to 8 p.m. [45 125]	0.60	6.00
CEYLON Colombo Radio	79° 53′ 00″ E. 6° 55′ 00″ N.	VPB	390	Government ..	300, **600**	P G	N	0.35	—
CHILI Ancud	73° 52′ 00″ W. 41° 52′ 00″ S.	—	—	Government ..	—	—	—	—	—
Antofagasta	23° 27′ 35″ S.						N	0.60	6.00

	18° 29′ 00″ S.								
Cape Raper	75° 38′ 00″ W. 46° 50′ 00″ S.	CCR	—	Government	—	—	—	—	—
Coquimbo	71° 20′ 00″ W 29° 57′ 35″ S.	CCO	400	Government	**600**, 1,300	P G	N	0.60	6.00
Evangelistas	74° 50′ 00″ W. 52° 47′ 00″ S.	CCZ	—	Government	—	—	—	—	—
Huafo	74° 39′ 00″ W. 43° 41′ 00″ S.	CCH	—	Government	—	—	—	—	—
Juan Fernandez	78° 53′ 00″ W. 33° 37′ 00″ S.	CCF	400	Government	**600**, 1,300	P G	—	0.60	6.00
Llanquihue	72° 55′ 00″ W. 41° 32′ 00″ S.	CCL	300, 1,200	Government	**600**, 2,500, 3,500 5,000	P G	N	0.60	6.00
Mocha	Island of Mocha 73° 53′ 44″ W. 38° 22′ 12″ S.	CCM	300	Government	600	P G	10 a.m. to midday.[49] 4 p.m. to 6 p.m.	0.60	6.00
Punta Arenas	70° 50′ 00″ W. 53° 10′ 00″ S.	CCP	300, 1,200	Government	**600**, 2,500, 3,500 5,000	P G	N	0.60	6.00
Talcahuano	73° 05′ 35″ W. 36° 44′ 00″ S.	CCT	700	Government	**600**, 1,300	P G	N	0.60	6.00
Valparaiso	71° 38′ 06″ W. 33° 01′ 06″ S.	CCV	300	Government, Naval	300, **600**, 1,300 [190]	P G	N	0.60	6.00
CHINA									
Canton	113° 20′ 00″ E. 23° 10′ 00″ N.	XNP	By day, 650; by night, 1,300	—	600, 1,200 **1,800**, 2,100	P G [191]	8 a.m. to 10 p.m. [193]	0.50 3(n)	—
Foochow	119° 18′ 00″ E. 26° 07′ 00″ N.	XOW	By day, 650; by night, 1,300	—	600, 1,200 **1,600**, 2,100	P G [191]	8 a.m. to 10 p.m. [193]	0.50 3(o)	—
Kalgan	Chihli 115° 20′ 00″ E. 40° 45′ 00″ N.	XQL	By day 650; by night, 1,300	—	1,200, **1,600** 2,100, 3,000	O	N	—	—
Peking NPP[256]	116° 30′ 20″ E 39° 54′ 50″ N.	NPP	150	United States Navy	—	O	N	—[253]	—[111]
Peking XPK	116°, 27′ 00″ E. 39° 54′ 00″ N.	XPK	By day, 650; by night, 1,300	—	600, 1,200 **1,600**, 2,100	O	N	—	—
Quang-Tchéou-Wan	110° 27′ 45″ E. of Greenwich 108° 07′ 31″ E. of Paris 21° 03′ 34″ N.	FWA	500	French Govt.	**600**, 1,200	P G, O	Seventh time-belt east of the Greenwich belt: 7 a.m. to 11 a.m., 2 p.m. to 5 p.m.	0.25	2.00
Shanghai	121° 29′ 00″ E. 31° 15′ 00″ N.	XSH	200	—	600	P G [191]	8 a.m. to 10 p.m.[193]	0.50 3(p)	—
Shanghai- Zikawei	121′ 25′ 48″ E. 31′ 11′ 32″ N.	FFZ	By day, 500; by night, 1,000	Soc. Francaise Radio-electrique (of Paris)	**600**, 900, 1,800	P G [275]	N	0.50	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge
CHINA—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Woosung, Kiangsu ..	121° 25′ 00″ E. 31° 21′ 00″ N.	XSG	By day, 650; by night, 1,300	—	600, 1,200 **1,800**, 2,100	P G [191] ..	N	0.50[3](*p*)	—
Wuchang	Hupeh 114° 23′ 00″ E. 30° 30′ 00″ N.	XOC	By day, 650; by night, 1,300	—	600, 1,200 **1,800**, 2,100 3,000	O	8 a.m. to 10 p.m.[193]	—	—
COCOS-KEELING ISLANDS									
Cocos	Indian Ocean 96° 53′ 20″ E. 12° 05′ 24″ S.	VPK	150	— [50]	**300**, 600	P G	N	0.60	—
COLOMBIA									
Cartagena, Rep. Colombia	75° 30′ 00″ W. 10° 40′ 00″ N.	CTG	By day, 600; by night, 1,200	Ges. für Drahtlose Tel.	**600**,1,500,2,000 2,500, 3,000	P G [16].. ..	6 a.m. to midnight	0.50	—
COSTA RICA									
Limon	—	X	—	Tropical Radio-telegraph Co.	—	P G	—	0.60	6.00
CUBA									
Guantanamo Bay [256] ..	South coast of Cuba 75° 08′ 30″ W. 19° 54′ 00″ N.	NAW	200	U.S. Navy ..	600	P G	N	0.30	3.00
CURACAO (COLONY OF)									
Aruba	Dutch West Indies 70° 02′ 01″ W. 12° 31′ 05″ N.	PJA	108	Government ..	600	— [51] ..	Local time. 9 am. to 11 a.m., 2 p.m. to 4 p.m. Sundays and public holidays: 11.45 a.m. to 12.45 p.m.	0.60	—
Bonaire, Ile	Dutch West Indies 68° 16′ 15″ W. 12° 09′ 20″ N.	PJB	108	Government ..	600	— [51] ..	9 a.m. to 11 a.m. 2 p.m. to 4 p.m. Sundays and public holidays: 11.45 a.m. to 12.45 p.m.	0.60	—

	12° 00' 20" N.								
DENMARK							Central European time[56]		
Blaavandshuk	North Sea coast 8° 05' 11" E. 55° 33' 29" N.	OXB	By day, 200; by night, 500	Government ..	300, **600**	P G[73]	N	0.15	—
Copenhagen	12° 34' 40" E. 55° 41' 13" N.	OXA	By day, 200; by night 500	Government ..	300, **600**	P G[73]	N	0.15	—
Drogden[205]	The Sound 12° 42' 00" E. 55° 33' 02" N	OUW	15	Government ..	300	—[53] ..	N	—	—
Gjedser	Falster Island 11° 55' 50" E 54° 34' 25" N.	OXC	135	State Railways of Denmark	300, **450**, 600, 800, 1,000	O[156]	6 a.m. to 8 p.m.	—	—
Gjedser Havn	Falster Island 11° 56' 03" E. 54° 32' 04" N.	OXD	25	Government ..	250	—[53] ..	in general N	—	—
Graadyb[205]	North Sea 8° 07' 07" E. 55° 21' 07" N.	OUX	30	Government ..	200	—[53] ..	N	—	—
Horns Rev[205]	North Sea 7° 19' 05" E. 55° 34' 01" N.	OUZ	30	Government ..	200	—[53] ..	N	—	—
Vyl[205]	North Sea 7° 45' 09" E. 55° 23' 06" N.	OUY	30	Government ..	200	—[53] ..	N	—	—
DOMINICAN REPUBLIC									
La Romana	68° 57' 20" W. 18° 25' 00" N.	HIB	200–250	Guanica Centrale	300, **600**, 1,600	P G[206]	Local time: 8 a.m. to midday, 2 p.m. to 5 p.m.	0.60[207] 0.30[208]	— —
San Domingo	69° 53' 21" W. 18° 25' 00" N.	HIA	250	Government ..	300, 600, 1,600	P G[206]	Local time: 8 a.m. to midday, 2 p.m. to 5 p.m.	0.60[207] 0.30[208]	— —
DUTCH EAST INDIES									
Amboina	Amboina Island 128° 06' 00" E. 3° 46' 40" S.	PKE	420	—	**600**, 1,600 2,300	P G[54]	Mean time of the Island of Java, 109° 48' 37.05" east of Greenwich: Week days and holidays: 7 a.m. to 8 a.m., 1.30 p.m. to 7 p.m. Sundays: 1.30 p.m. to 7 p.m.	—[55]	—[55]

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature o Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
DUTCH EAST INDIES—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Balikpapan	116° 57′ 00″ E 1° 19′ 00″ S.	—	—	Royal Dutch Petroleum Co.	—	—	—	—	—
Koepang	Timor 123° 36′ 50″ E. 10° 00′ 30″ S.	PKD	420	—	**600**, 1,600, 2,300	P G [54]	Mean time of the Island of Java, 109° 48′ 37.05″ east of Greenwich: Week days and holidays: 7 a.m. to 8 a.m., 1.30 p.m. to 7 p.m. Sundays: 1.30 p.m. to 7 p.m.	— [55]	— [55]
Sabang	Sumatra, Weh Island 95° 20′ 06″ E. 5° 54′ 00″ N.	PKA	By day, 400; by night, 800	—	600	P G	N	0.40	4.00
Sitoebondo	Java 114° 05′ 30″ E. 17° 41′ 00″ S.	PKC	420	—	**600**, 1,600 2,300	P G [54]	Mean time of the Island of Java, 109° 48′ 37.05″ east of Greenwich: Week days and holidays: 7 a.m. to 8 a.m., 1.30 p.m. to 7 p.m. Sundays: 1.30 p.m. to 7 p.m.	— [55]	— [55]
Tarakan	117° 30′ 00″ E. 3° 20′ 00″ N.	—	—	Royal Dutch Petroleum Co.	—	—	—	—	—
Weltevreden	Near Batavia 106° 50′ 20″ E. 6° 09′ 40″ S	PKB	270	Government Marine Dept.	600	P G, O.. ..	Mean time of the Island of Java, 109° 48′ 37.05″ east of Greenwich: Week days (except Thurs.): 8 a.m. to 6 p.m. Thurs.: 8 a.m. to 9 p.m. Sundays and holidays: 9 a.m. to	0.40 [207]	4.00 [207]

EGYPT									
Port Said	32° 19′ 00″ E. 31° 14′ 00″ N.	SUB	350	Lloyd's	300, 600	P G	N	60	—
Port Sudan	37° 12′ 55″ E. 19° 37′ 05″ N.	SUD	250	Sudan Government	300, 600	P G	7 a.m. to 1 p.m.[241] 5 p.m. to 11 p.m.	0.60 [3](q)	—
ERITREA									
Asmara	38° 30′ 00″ E. 15° 20′ 00″ N.	ICW	—	Italian Government	—	—	—	—	—
Assab	42° 30′ 00″ E. 13° 06′ 00″ N.	ICY	—	Italian Government	—	—	—	—	—
Massaua	Red Sea 39° 28′ 52″ E. 15° 36′ 30″ N	ICX	1,600	Italian Government	4,000	—[57] ..	X	—	—
FALKLAND ISLANDS									
Port Stanley	57° 49′ 15″ W. 51° 41′ 15″ S.	VPC	650	Colonial Govt. ..	300, 600	P G	Local time. (3 hours 55 minutes later than Greenwich time.) 9 a.m. to midday, 9 p.m. to midnight	0.60 [3] (u)	—
FIJI ISLANDS							Fiji Islands time. (12 hours in advance of Greenwich time.)		
Labasa	179° 24′ 00″ E. 16° 26′ 00″ S.	VPE	300	Colonial Govt. ..	300, 600	P G [58]	—[60]	0.60	—
Suva	Viti Levu 178° 27′ 30″ E. 18° 08′ 55″ S.	VPD	300	Colonial Govt. ..	300, 600	P G [58]	—[60]	0.60	—
Taveuni	179° 59′ 15″ E. 16° 46′ 30″ S.	VPF	200	Colonial Govt. ..	300, 600	P G [58]	—[60]	0.60	—
FRANCE AND ALGERIA									
Aïn El-Turck	To the west of Oran 0° 45′ 30″ W. of Greenwich 2° 05′ 30″ W. of Paris	FUO	—	Navy	—	O	Greenwich time. 9 a.m. to midnight.	—	—
Ajaccio TSF	35° 45′ 00″ N. 8° 44′ 00″ E. of Greenwich 6° 24′ 00″ E. of Paris	FFA	350	Navy	600	P G [16]	7 a.m. to 10 p.m.	0.40 [61]	—[61]
Boulogne-sur-Mer TSF ..	41° 55″ 00″ N. 1° 37 00″ E. of Greenwich 0° 43′ 00″ W. of Paris	FFB	160	Government ..	300, 600	P G [16]	N	0.40 [62]	—[62]
Bouscat TSF	50° 43′ 00″ N. Near Bordeaux 0° 37′ 12″ W. of Greenwich 2° 57′ 26″ W. of Paris 44° 52′ 27″ N.	FFX	160	Government	300, 600	P G [264]	N	0.40	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
	Meridian of Greenwich.						Greenwich time.	Francs.	Francs.
FRANCE AND ALGERIA—*contd.*									
Brest-Arsenal	4° 29′ 00″ W. of Greenwich 6° 49′ 00″ W. of Paris 48° 23′ 00″ N.	FUB	—	Navy	—	— [63] ..	—	—	—
Brest-Kerlaer	4° 33′ 20″ W. of Greenwich 6° 53′ 34″ W. of Paris 48° 19′ 58″ N.	FFK	350	Navy	600	P G [16]	7 a.m. to 10 p.m.	0.40	—
Cherbourg TSF	1° 38′ 00″ W. of Greenwich 3° 58′ 00″ W. of Paris 49° 39′ 00″ N.	FFC	350	Navy	600	P G [16]	N	0.40 [62]	— [62]
Crosde-Cagnes	To the west of Nice 7° 10′ 00″ E. of Greenwich 4° 50′ 00″ E. of Paris 43″ 39′ 00° N.	FFG	160	Government ..	**300, 600**	P G [16]	N	0.40 [61]	— [61]
Dieppe	1° 05′ 00″ E. of Greenwich 1° 15′ 00″ W. of Paris 49° 55′ 00″ N.	FFI	55	State Railway Administration	400	P [64]	10 a.m. to 2 p.m., 8.30 p.m. to 11.30 p.m.	—	—
Dunkerque TSF	2° 22′ 00″ E. of Greenwich 0° 02′ 00″ E. of Paris 51° 02′ 00″ N.	FFD	350	Navy	600	P G [16]	7 a.m. to 10 p.m.	0.40 [62]	— [62]
Eiffel Tower, Paris ..	—	FL	—	Army	—	—	—	—	—
Fort-de-l'Eau	To the east of Algiers 3° 11′ 00″ E. of Greenwich 0° 51′ 00″ E. of Paris [illegible]	FFO	380	Government ..	**300, 600**	P G [264] ..	N	0.40 [61]	— [61]

Havre TSF	— of Greenwich 5° 41′ 00″ W. of Paris 47° 44′ 00″ N.	FFU	—			[64]	7 a.m. to 10 p.m.	0.40	—
Ouessant	To the west of Finistère 5° 04′ 00″ W. of Greenwich 7° 24′ 00″ W. of Paris 48° 28′ 00″ N.	FFF	380	Government ..	300, 600	P G [18]	N	0.40	—
Porquerolles	Hyeres Islands 6° 12′ 00″ E. of Greenwich 3° 52′ 00″ E. of Paris 42° 59′ 00″ N.	FFP	350	Navy	600	— [63] ..	—	—	—
Port-Vendres	Gulf of Lions 3° 06′ 00″ E. of Greenwich 0° 46′ 00″ E. of Paris 42° 31′ 00″ N.	FUV	—	Navy	—	— [63] ..	—	—	—
Rochefort TSF	0° 58′ 00″ W. of Greenwich 3° 18′ 00″ W. of Paris 45° 57′ 00″ N.	FFR	350	Navy	600	P G [18]	7 a.m. to 10 p.m.	0.40	—
S. Maries-de-la-Mer ..	Gulf of Lions 4° 26′ 00″ E. of Greenwich 2° 06′ 00″ E. of Paris 43° 27′ 00″ N.	FFS	380	Government ..	300, 600	P ..	N	0.40 [61]	— [61]
Toulon-Ecole	5° 55′ 00″ E. of Greenwich 3° 35′ 00″ E. of Paris 43° 07′ 00″ N.	FUE	—	Navy	—	— [63] ..	—	—	—
Toulon-Mourillon ..	5° 55′ 00″ E. of Greenwich 3° 35′ 00″ E. of Paris 43° 07′ 00″ N.	FUT	—	Navy	—	O — ..	9 a.m. to midnight.	—	—
FRENCH EQUATORIAL AFRICA									
Loango	Congo, Pointe Noire 11° 43′ 02″ E. of Greenwich 9° 22′ 48″ E. of Paris 4° 46′ 49″ S	FGO	By day, 275; by night, 550	—	300, 600, 1,800	P G [65]	One hour in advance of Greenwich time. 8 a.m. to 10.30 a.m.[66], 2 p.m. to 4.30 p.m.[66]	0.30	3.00

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
FRENCH INDO-CHINA									
Cap Saint-Jacques ..	Meridian of Greenwich To the south-east of Saigon 107° 05′ 14″ E. of Greenwich 104° 45′ 00″ E. of Paris 10° 20′ 00″ N.	FCA	250	Government ..	300	P G, O ..	Seventh time-belt east of the Greenwich belt. 7 a.m. to 11 a.m., 2 p.m. to 5 p.m.	Francs. 0.25	Francs. 2.00
Hanoï	105° 54′ 18″ E. of Greenwich 103° 34′ 04″ E. of Paris 21° 03′ 49″ N.	FAO	1,000	Government ..	**600**,2,400,3000	P G [67] O ..	7 a.m. to 11 a.m. 2 p.m. to 5 p.m.	0.25	2.00
Kien-An	Near Haïphong 106° 41′ 59″ E. of Greenwich 104° 21′ 45″ E. of Paris 20° 48′ 34″ N.	FKA	350	Government ..	**600**	P G, O ..	7 a.m. to 11 a.m. 2 p.m. to 5 p.m.	0.25	2.00
Tourane	Touran Bay, Observatory Islet 108° 12′ 41″ E. of Greenwich 105° 52′ 27″ E. of Paris 16° 06′ 55″ N.	FLT	250	Government ..	600	P G, O.. ..	7 a.m. to 11 a.m. 2 p.m. to 5 p.m.	0.25	2.00
FRENCH OCEANIA									
Papeete, Ile Tahiti ..	149° 29′ 15″ W. 17° 29′ 30″ S.	FOP	By day, 600; by night, 1,200	Government ..	300, **600**, 2,000, 2,500 [391]	P G [300] (*i*) ..	Local time: midnight to 2 a.m., 9 a.m. to 9.15 a.m., 10 a.m. to 10.15 a.m., 11 a.m. to 11.15 a.m., 3 p.m. to 3.15 p.m., 4 p.m. to 4.15 p.m., 5 p.m. to 5.15 p.m., 7.45 p.m. to midnight. Holidays: midnight to 2 a.m., 8 a.m. to 9 a.m., 7.45 p.m. to to midnight.	0.40	—

							first time-belt west of the Greenwich belt.		
Atar [192]	Mauritania	—	—	Government ..	—	P G [6 299] ..	—	—	—
Chinguetti [192]	Mauritania	—	—	Government ..	—	P G [6 299] ..	—	—	—
Conakry	Guinea 13° 42′ 46″ W. of Greenwich 16° 03′ 00″ W. of Paris 9° 30′ 59″ N.	FCO	By day, 540; by night, 1,600	Government ..	600, 1,600 [68]	P G	6 a.m. to 10 p.m.	0.30	—
Dakar	Senegal 17° 25′ 22″ W. of Greenwich 19° 45′ 36″ W. of Paris 14° 40′ 27″ N.	FDA	By day, 250; by night, 450	Government ..	600	P G	N	0.30	—
Port-Etienne	Mauritania, Bay of Lévrier 17° 03′ 01″ W. of Greenwich 19° 23′ 15″ W. of Paris 20° 55′ 39″ N.	FPE	By day, 540; by night, 1,600	Government ..	600, 900 [69]	P G [70]	from sunrise to sunset	0.30 [70]	— [70]
Rufisque	Senegal 17° 16′ 23″ W. of Greenwich 19° 36′ 37″ W. of Paris 14° 43′ 04″ N.	FRU	By day, 540; by night, 1,600	Government ..	1,600 [71]	P R [72]	from sunrise to sunset	0.30	—
Tabou	Ivory Coast 7° 22′ 27″ W. of Greenwich 9° 42′ 41″ W. of Paris 4° 25′ 19″ N.	FTA	150	Government ..	600	P G	from sunrise to sunset	0.30	—
GERMANY							Central European time.[56]		
Adlergrund Lightship ..	Baltic Sea 14° 22′ 12″ E. 54° 49′ 59″ N.	KAG	55	—	300	P R [74 75] ..	N	0.18 [74]	1.80 [74]
Amrumbank Lightship ..	North Sea 7° 53′ 12″ E. 54° 33′ 12″ N.	KAF	27	—	300, 600	P R [74 75] ..	N	0.18 [74]	1.80 [74]
Aussenjade Lightship ..	North Sea 7° 56′ 40″ E. 53° 51′ 30″ N.	KAU	55	—	300	P R [74 75] ..	N	0.18 [74]	1.80 [74]
Borkum New Lighthouse	North Sea 6° 40′ 12″ E. 53° 34′ 48″ N.	KBM	100	—	300, 600	P G [88]	N	0.18	1.80

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
GERMANY—*contd.*	Meridian of Greenwich.						Central European time.[56]	Francs.	Francs.
Borkum Riff Lightship ..	North Sea 6° 03′ 30″ E. 53° 45′ 30″ N.	KBR	60	—	300, 600	P R[74 75] ..	N	0.18[74]	1.80[74]
Bremerhaven Lloydhalle	North Sea coast 8° 33′ 08″ E. 53° 33′ 04″ N.	KBH	200	Norddeutscher Lloyd Co.	300	P R[76]	N	0.18	1.80
Bülk	Kiel Bay 10° 12′ 00″ E. 54° 27′ 00″ N.	KBK	110	—	300	P G[77 89] ..	N	0.18	1.80
Cuxhaven	North Sea coast 8° 42′ 42″ E. 53° 52′ 27″ N.	KCX	By day, 110; by night, 170	—	300, 600	P G[78 88] ..	N	0.18	1.80
Danzig	Baltic Coast 18° 39′ 08″ E. 54° 20′ 56″ N.	KAZ	By day, 330; by night, 660	—	300, 600, 1,800	P G[90]	6 a.m. to midnight.[79]	0.18	1.80
Eider Lightship	North Sea 8° 18′ 18″ E 54° 16′ 06″ N.	KAJ	30	—	300, 600	P R[74 75] ..	N	0.18[74]	1.80[74]
Eiderlotsengaliote Lightship	North Sea 8° 37′ 00″ E. 54° 13′ 30″ N.	KCL	21	—	300, 600	P R[74 75] ..	N	0.18[74]	1.80[74]
Eilvise	—	—	—	Government ..	—	—	—	—	—
Elbe Lightship Eins ..	North Sea 8° 15′ 00″ E. 54° 00′ 30″ N.	KBF	60	—	300	P R[74 75] ..	N	0.18[74]	1.80[74]
Heligoland	North Sea 7° 53′ 00″ E. 54° 11′ 00″ N.	KAH	110	—	300	P R[80 88] ..	N	0.18	1.80
Nauen	—	—	—	Government ..	—	—	—	—	—
Norddeich	North Sea coast 7° 08′ 00″ E. 53° 36′ 00″ N.	KAV	By day, 420; by night, 830	Government ..	300, 600, 1,800	P G[81 88] ..	N	0.18	1.80
Sassnitz	Island of Rügen 13° 39′ 14″ E. 54° 30′ 52″ N.	KCV	110	Prussian Railway Administration	375	P R[82 88] ..	N	0.18	1.80
Swinemünde	Usedom Island	KAW	By day,	—	300, 600, 1,800	P G[89]	6 a.m. to midnight.[84]	0.18	1.80

	7° 49′ 03″ E 53° 54′ 18″ N.				300		N	0.18 [74]	1.80 [73]
GIBRALTAR									
Gibraltar (North Front) ..	5° 21′ 00″ W 36° 09′ 00″ N.	BYW	—	—	—	O	—	—	—
Gibraltar (Windmill Hill) ..	5° 21′ 00″ W 36° 07′ 00″ N.	BYX	—	—	—	O	—	—	—
GILBERT ISLANDS									
Ocean Island	—	—	—	Australian Govt.	—	P G [300] (*h*) ..	—	—	—
GOLD COAST									
Accra	0° 12′ 00″ W 5° 32′ 30″ N.	VPG	250	Government ..	300, 600	P G	Greenwich time: 8 a.m. to 4 p.m., except Sundays	0.40	—
GREAT BRITAIN							Greenwich time.		
Aberdeen	2° 07′ 00″ W 57° 08′ 30″ N.	BYD	—	Admiralty ..	—	O	—	—	—
Ballycastle, Antrim ..	Ireland, North Channel 6° 12′ 00″ W. 55° 11′ 00″ N.	GSL	15	Post Office ..	250	— [91]	8.25 a.m. to 8.25 p.m.	—	—
Broomfield, Essex	0° 28′ 00″ E. 51° 45′ 00″ N.	MAX	—	Marconi Co. ..	—	Experimental ..	—	—	—
Bunbeg	North-west coast of Ireland 8° 09′ 00″ W. 55° 04′ 00″ N.	BYR	—	Admiralty ..	—	O	—	—	—
Butt of Lewis	58° 32′ 00″ N. 6° 14′ 00″ W.	—	—	Lloyd's .. .	—	Private ..	—	—	—
Caister-on-Sea	Near Yarmouth 1° 42′ 00″ E. 52° 37′ 00″ N.	GCS	150	Post Office .	300, 600	P G	N	0.60 [92] 0.30 [93] 0.15 [94]	— [93] 1.80 [93] 1.50 [94]
Calshot	Hampshire, to the south-east of Southampton 1° 18′ 30″ W. 50° 49′ 15″ N.	BZZ	—	Admiralty	—	O	—	—	—
Carnarvon	4° 11′ 00″ W. 53° 07′ 00″ N.	MUU	—	Marconi Co. ..	—	Transatlantic Service	N	—	—
Chelmsford	Essex	MZX	—	Marconi Co. ..	—	Experimental ..	—	—	—
Cleethorpes	South-east of Grimsby 0° 02′ 00″ W. 53° 31′ 00″ N.	BYB	—	Admiralty ..	—	O	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
GREAT BRITAIN—*contd.*	Meridian of Greenwich.						Greenwich time	Francs.	Francs.
Clifden	West coast of Ireland 10° 01′ 00″ W. 53° 27′ 00″ N.	MFT	—	Marconi Co.	—	Transatlantic service	N	—	—
Corkbeg	Entrance to the port of Cork 8° 15′ 00″ W. 51° 49′ 00″ N.	BYQ	—	Admiralty	—	O	—	—	—
Cromarty	Black Isle 4° 01′ 30″ W. 57° 41′ 45″ N.	BYP	—	Admiralty	—	O	—	—	—
Crookhaven	South coast of Ireland 9° 46′ 00″ W. 51° 27′ 00″ N.	GCK	250	Post Office	300, **600**	P G	N	0.60 [92] 0.30 [93] 0.15 [94]	— [92] 1.80 [93] 1.50 [94]
Cross Sand Lightship	North-east of Yarmouth 1° 54′ 00″ E. 52° 38′ 00″ N.	GVA	15	Trinity House	230	Reception and transmission of distress signals	N	— [95]	— [95]
Cullercoats	Near Tynemouth 1° 26′ 00″ W 55° 02′ 00″ N.	GCC	250	Post Office	300, **600**	P G	N	0.60 [92] 0.30 [93] 0.15 [94]	— [92] 1.80 [93] 1.50 [94]
Culver Cliff	Isle of Wight 1° 06′ 00″ W. 50° 40′ 00″ N.	BYM	—	Admiralty	—	O	—	—	—
Dover	1° 18′ 00″ E. 51° 07′ 00″ N.	BYL	—	Admiralty	—	O	—	—	—
Dundee	2° 55′ 00″ W. 56° 27′ 00″ N.	BZW	—	Admiralty	—	O	—	—	—
Eastchurch	Isle of Sheppey 0° 51′ 00″ E. 51° 23′ 30″ N.	BZU	—	Admiralty	—	O	—	—	—
East Goodwin Lightship	Straits of Dover 1° 36′ 00″ E. 51° 13′ 00″ N.	GVB	15	Trinity House	230	Reception and transmission of distress signals	N	— [95]	— [95]
Farnborough	Hampshire 0° 45′ 30″ W. 51° 17′ 00″ N.	BZT	—	Admiralty	—	O	—	—	—
[illegible]	[illegible] 00″ N.	—	—	Lloyd's	—	For signal duty	—	—	—

	51° 57′ 00″ N.								
Fishguard	Pembrokeshire 4° 58′ 00″ W. 51° 59′ 00″ N.	GRL	200	Post Office ..	300, 600	P G	N	0.60 [92] 0.30 [93] 0.15 [94]	— [92] 1.80 [93] 1.50 [94]
Flannan Islands	58° 17′ 00″ N. 7° 33′ 00″ W.	—	—	Lloyd's	—	Private ..	—	—	—
Folkestone Harbour ..	Straits of Dover 1° 11′ 30″ E. 51° 04′ 30″ N.	GUR	45	South Eastern and Chatham Railway	300, 600	P[108]	—	—	—
Fort George	Inverness Firth 4° 04′ 00″ W. 57° 35′ 00″ N.	BZV	—	Admiralty ..	—	O	—	—	—
Grimsby	0° 04′ 00″ W. 53° 35′ 00″ N.	BYV	—	Admiralty ..	—	O	—	—	—
Gull Lightship	Straits of Dover 1° 28′ 00″ E. 51° 16′ 00″ N.	GVC	15	Trinity House ..	230	Reception and transmission of distress signals	N	— [95]	— [95]
Haven, The (Poole) ..	1° 56′ 00″ W. 50° 40′ 00″ N.	MHH	—	Marconi Co ..	—	Experimental..	—	—	—
Heysham Harbour ..	Morecambe Bay 2° 55′ 00″ W. 54° 02′ 00″ N.	GHH	150	Midland Railway	400	P, restricted to ships of Midland Rly Co.	N, during the crossing between Heysham and Belfast	—	—
Horsea	Near Portsmouth 1° 06′ 00″ W. 50° 50′ 30″ N.	BYC	—	Admiralty ..	—	O	—	—	—
Hunstanton	North Sea, The Wash 0° 30′ 00″ E. 52° 57′ 00″ N.	GHC	100	Post Office ..	300	Special correspondence	N	—	—
Inchkeith	Firth of Forth 3° 09′ 00″ W. 56° 02′ 00″ N.	BZA	—	Admiralty ..	—	O	—	—	—
Inishtrahull	55° 25′ 00″ N. 7° 13′ 00″ W.	—	—	Lloyd's	—	For signal duty	—	—	—
Ipswich	1° 09′ 00″ E. 52° 05′ 00″ N.	BYE	—	Admiralty ..	—	O	—	—	—
Isle of Grain	Kent, mouth of the Thames 0° 43′ 00″ E. 51° 26′ 15″ N.	BZY	—	Admiralty ..	—	O	—	—	—
Kingsnorth	0° 36′ 00″ E. 51° 25′ 00″ N.	BZS	—	Admiralty ..	—	O	—	—	—
Land's End	West coast of Cornwall 5° 40′ 10″ W. 50° 07′ 00″ N.	GLD	250	Post Office ..	300, 600	P G	N	0.60 [92] 0.30 [93] 0.15 [94]	— [92] 1.80 [93] 1.50 [94]
Leafield	1° 32′ 00″ W. 51° 50′ 00″ N.	—	—	Marconi Co. ..	—	Private ..	—	—	—
Lerwick	Shetland Islands 1° 11′ 00″ W. 60° 09′ 00″ N.	BYU	—	Admiralty ..	—	O	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
GREAT BRITAIN—*contd.*	Meridian of Greenwich.						Greenwich time.	Francs.	Francs.
Lochboisdale	Hebrides 7° 16′ 00″ W. 57° 08′ 00″ N.	GCB	150	Post Office ..	300	—[97] ..	8 a.m. to 8 p.m., week days only	—	—
Malin Head	North coast of Ireland 7° 21′ 00″ W. 55° 22′ 00″ N.	GMH	250	Post Office ..	300, **600**	P G	N	0.60[92] 0.30[93] 0.15[94]	—[92] 1.80[93] 1.50[94]
Marconi House	London	—	—	Marconi Co. ..	—	Private ..	—	—	—
Newhaven..	0° 04′ 00″ E. 50° 48′ 00″ N.	GNV	120	London, Brighton & S.C. Railway	400	—[92]	10 a.m. to 2 p.m., 8.30 p.m. to 11.30 p.m.	—	—
Niton	Isle of Wight 1° 17′ 10″ W. 50° 34′ 30″ N.	GNI	150	Post Office ..	300, **600**	P G	N	0.60[92] 0.30[93] 0.15[94]	—[92] 1.80[93] 1.50[94]
North Foreland	North of Ramsgate 1° 26′ 00″ E. 51° 23′ 00″ N.	GNF	150	Post Office ..	300, **600**	P G	N	0.60[92] 0.30[93] 0.15[94]	—[92] 1.80[93] 1.50[94]
Parkeston Quay	Near Harwich 1° 15′ 00″ E. 51° 56′ 00″ N.	GPQ	130	Great Eastern Railway	**450**, 600[99]	P restricted to the ships of the Great Eastern Railway Company	N, during the crossing of the ships	—	—
Pembroke	4° 58′ 00″ W. 51° 41′ 00″ N.	BYF	—	Admiralty ..	—	O	—	—	—
Poldhu	Extreme south-west of England 5° 16′ 00″ W. 50° 02′ 00″ N	MPD	1,000	Marconi Co. ..	2,800	P R[104]	11 p.m. to 2 a.m.	3.00	—
Porthcurno	50° 07′ 00″ N. 5° 33′ 00″ W.	—	—	Eastern Telegraph Co.	—	—	—	—	—
Portland Bill	English Channel Isle of Portland 2° 27′ 00″ W. 50° 32′ 00″ N.	BYN	—	Admiralty ..	—	O	—	—	—
Portpatrick	Scotland, North Channel 5° 09′ 00″ W. 54° 50′ 00″ N.	BYS	—	Admiralty ..	—	O	—	—	—
Portsmouth Signal School	1° 06′ 00″ W.	BZC	—	Admiralty ..	—	O	—	—	—

	port of Plymouth 4° 13′ 00″ W. 50° 19′ 00″ N.								
Rathlin Island	North Channel 6° 10′ 00″ W. 55° 17′ 00″ N.	GRN	15	Post Office ..	250	— [100] ..	8.25 a.m. to 8.25 p.m.	—	—
Rosyth	West of Edinburgh 3° 23′ 00″ W. 56° 01′ 00″ N.	BYH	—	Admiralty ..	—	O	—	—	—
Scarborough	0° 26′ 00″ W. 54° 16′ 00″ N.	BYI	—	Admiralty ..	—	O	—	—	—
Seaforth	Liverpool 3° 01′ 00″ W. 53° 28′ 00″ N.	GLV	150	Post Office ..	300, 600	P G	N	0.60 [92] 0.30 [93] 0.15 [94]	— [92] 1.80 [93] 1.50 [94]
Sheerness	Mouth of the Thames 0° 45′ 00″ E. 51° 27′ 00″ N.	BYK	—	Admiralty ..	—	O	—	—	—
South Goodwin Lightship	Straits of Dover 1° 28′ 00″ E. 51° 09′ 00″ N.	GVD	15	Trinity House ..	230	Reception and transmission of distress signals	N	— [95]	— [95]
Stockton	Near Middlesbrough 1° 21′ 00″ W. 54° 34′ 00″ N.	BYT	—	Admiralty ..	—	O	—	—	—
Sunk Lightship	South-east of Harwich 1° 30′ 00″ E. 51° 51′ 00″ N.	GVE	30	Trinity House ..	230	Reception and transmission of distress signals	N	— [95]	— [95]
Tobermory	Isle of Mull 6° 04′ 00″ W. 56° 36′ 00″ N.	GCA	150	Post Office ..	300	— [102] ..	8 a.m. to 8 p.m., week days only	—	—
Tongue Lightship ..	North of Margate 1° 23′ 00″ E 51° 30′ 00″ N.	GVF	15	Trinity House ..	230	Reception and transmission of distress signals	N	— [95]	— [95]
Valencia Island ..	South-west of County Kerry, Ireland	—	—	—	—	—	—	—	—
Whitehall, London ..	0° 10′ 00″ W. 51° 30′ 00″ N.	BYA	—	Admiralty ..	—	O	—	—	—
Wick	North coast of Scotland 3° 06′ 00″ W. 58° 26′ 00″ N.	BYG	—	Admiralty ..	—	O	—	—	—
Yarmouth..	Norfolk 1° 44′ 15″ E. 52° 34′ 45″ N.	BZX	—	Admiralty ..	—	O	—	—	—
GREECE									
Athens	23° 43′ 13.8″ E. 37° 58′ 19.7″ N.	SXA	—	Government ..	—	O	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature o Service.	Hours of Service.	Coast Charge Per Word.	Coast Charge Minimum Charge.
REECE—*contd.*	Meridian of Greenwich.						Greenwich time.	Francs.	Francs.
Salamis	Island of Salamis 23° 32′ 00″ E. 37° 58′ 15″ N.	SXL	—	Government ..	—	O	—	—	—
Salonique	22° 59′ 00″ E. 40° 36′ 00″ N.	SXC	—	Government ..	—	O	—	—	—
Syra	Island of Syra 24° 56′ 33″ E. 37° 25′ 43″ N.	SXS	—	Government ..	—	O	—	—	—
Thassos	Island of Thassos 24° 43′ 30″ E. 40° 46′ 00″ N.	SXT	—	Government ..	—	O	—	—	—
HAWAIIAN ISLANDS							Local time.		
Fort de Russy [255]	Honolulu	WZG	300	U.S. Army ..	—	O	—	—	—
Heeia Point	Island of Oahu 157° 48′ 20″ W. 21° 26′ 00″ N.	KHX	2,500	Federal Telegraph Co.	300, **600**, 1,800, 3,000 8,000, 9,300, 10,600	P G[238]	7.30 a.m. to 11.30 p.m.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Kaunakakai	Island of Molokai 157° 01′ 29″ W. 21° 05′ 21″ N.	KHO	30	Mutual Telephone Co., Ltd.	300, 450, **600**	— [239]	7 a.m. to midday, 1 p.m. to 5.30 p.m.	—	—
Kawaihae	Island of Hawaii 155° 50′ 05″ W. 20° 02′ 38″ N.	KHN	300	Mutual Telephone Co., Ltd.	300, 575, **600**	— [278]	7 a.m. to midday, 1 p.m. to 5.30 p.m.	—	—
Koko Head KHJ ..	Island of Oahu 157° 42′ 00″ W. 21° 17′ 00″ N.	KHJ	—	Marconi Co. ..	—	— [240]	—	—	—
Koko Head KIE ..	Island of Oahu 157° 42′ 30″ W. 21° 16′ 00″ N.	KIE	2,200	Marconi Co. ..	6,200	— [217]	N	—	—
Lahaina	Island of Maui 156° 40′ 50″ W. 20° 52′ 29″ N.	KHL	300	Mutual Telephone Co., Ltd.	300, 575, **600**	— [278]	7 a.m. to midday, 1 p.m. to 5.30 p.m.	—	—
Lihue	Island of Kauai 159° 22′ 16″ W. 21° 57′ 58″ N.	KHM	300	Mutual Telephone Co., Ltd.	300, 575, **600**	— [278]	7 a.m. to midday, 1 p.m. to 5.30 p.m.	—	—
Pearl Harbor [256] ..	Island of Oahu	NPM	100	U.S. Navy ..	—	O	N	— [253]	— [253]

HOLLAND									
Amsterdam	4° 54′ 39″ E. 52° 22′ 23″ N.	PCA	—	Government ..	—	O	—	—	—
Haaks Lightship	To the west of Helder 4° 18′ 08″ E. 52° 57′ 08″ N.	PCO	40	Government ..	400	Special [105] ..	X	— [106]	— [106]
Helder	4° 46′ 38″ E. 52° 57′ 44″ N	PCB	—	Government ..	—	O	—	—	—
Hellevoetsluis	4° 08′ 00″ E. 51° 49′ 30″ N.	PCC	—	Government ..	—	O	—	—	—
Noord-Hinder Lightship	North Sea 2° 39′ 54″ E. 52° 05′ 12″ N.	PCN	40	Government ..	400	Special [105] ..	X	— [106]	— [106]
Scheveningen-Port ..	North Sea coast, near The Hague 4° 15′ 55″ E. 52° 06′ 00″ N.	PCH	1,200	Government ..	300, 500, 600, 1,800	P G [107] ..	N	0.20	2.00
Terschellingerbank Lightship	4° 51′ 31.5″ E. 53° 27′ 00″ N.	PCM	80	Government ..	300, 400, 600	Special [105] ..	X	— [106]	— [106]
INDIA See **BRITISH INDIA**									
ITALIAN SOMALILAND									
Bardera	42° 16′ 15″ E. 2° 21′ 10″ N.	ISN	200	Government ..	700–750	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Brava	Bénadir 44° 02′ 04″ E. 1° 06′ 25″ N.	ISC	200	Government ..	700–750	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Bulo Burti	45° 34′ 00″ E. 3° 52′ 00″ N.	ISJ	100	Government ..	600	P G [16]	Sunrise to sunset.	0.30	—
Giumbo	Bénadir 42° 37′ 27″ E. 0° 14′ 51″ S.	ISD	200	Government ..	700–750	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Iscia Baidoa	43° 39′ 31″ E. 3° 07′ 10″ N.	ISH	160	Governmen ..	300, 600, 800	P G [16]	Sunrise to sunset	0.30 [108]	—
Itala	Bénadir 46° 19′ 43″ E. 2° 45′ 27″ N.	ISM	100	Government ..	300	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Lugh	42° 36′ 00″ E. 3° 48′ 00″ N.	ISO	100	Government ..	300	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Mahaddei Uen	45° 31′ 01″ E. 2° 58′ 14″ N.	ISF	160	Government ..	600	P G [16]	Sunrise to sunset	0.30 [108]	— [108]

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
ITALIAN SOMALILAND—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Merka	Bénadir 44° 46′ 22″ E. 1° 42′ 49″ N.	ISB	160	Government ..	300	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Mogadiscio ISE	Bénadir 45° 21′ 14.5″ E 2° 02′ 13.5″ N.	ISE	160	Government ..	300	P G [16]	Sunrise to sunset	0.30 [108]	— [108]
Mogadiscio ISG	Bénadir 45° 21′ 14.5″ E. 2° 02′ 13.5″ N.	ISG	1,600	Government ..	4,000	P G [110 16] ..	X	0.30	—
Oddur	43° 45′ 00″ E. 4° 07′ 05″ N.	ISI	100–150	Government ..	300, **600**	P G [16]	6 a.m. to 6 p.m.[245]	0.30	—
ITALY									
Ancona Radio	13° 31′ 29″ E. 43° 31′ 40″ N.	ICA	270	Government ..	300, **600**	P G [16]	N	0.30	—
Bologna	11° 20′ 00″ E. 44° 30′ 00″ N.	IGB	—	Army	—	— [148] ..	—	—	—
Brindisi Radio	Coast of the Adriatic Sea, Puglie, Province of Lecce 17° 56′ 44″ E. 40° 38′ 43″ N.	ICE	270	Government ..	300, **600**	P G [16]	N	0.30	—
Cagliari Radio	Sardinia 9° 33′ 30″ E. 39° 12′ 30″ N.	ICC	270	Government ..	300, **600**	P G [16]	Sunrise to sunset	0.30	—
Capo Sperone Radio ..	Sardinia, Island of S. Antioco 8° 24′ 42″ E. 38° 57′ 59″ N.	ICR	270	Government ..	300, **600**	P G [16]	N	0.30	—
Centopozzi Radio ..	Puglie, Province of Foggia 15° 36′ 45″ E. 41° 42′ 00″ N.	ICM	160	Government ..	300, **600**	P G [16]	Sunrise to sunset	0.30	—
Coltano	43° 38′ 00″ N. 10° 24′ 00″ E.	ICI	—	Government ..	—	—	Private	—	—
Firenze	11° 10′ 25″ E. 43° 4[illegible]′ 36″ N.	IGF	—	Army	—	— [148] ..	—	—	—
[illegible]	[illegible]	[illegible]	160	Government	300, **600**	P G [16]	N	0.30	—

Maddalena Radio	Strait of Bonifacio 9° 25' 1[illegible] E. 41° 12' 50" N.	ICH	215	Government	300, 600	P G [16]	N	[illegible]	[illegible]
Messina IFM	15° 37' 27" E. 38° 15' 00" N.	IFM	27	Government (State Railways)	50	O [109]	—	—	—
Messina ICF	—	—	—	Army	—	O	—	—	—
Milano	9° 10' 05" E. 45° 20' 40" N.	IGM	—	Army	—	—[148] ..	—	—	—
Napoli Radio	14° 15' 36.5" E. 40° 50' 14" N.	ICN	270	Government ..	300, 600	P G [16]	N	0.30	—
Palermo Radio	13° 16' 40" E. 38° 11' 48" N.	ICP	270	Government ..	300, 600	P G [16]	Sunrise to sunset	0.30	—
Reggio Calabria	15° 38' 30" E. 38° 08' 00" N.	IFR	27	Government (State Railways)	50	O [109]	—	—	—
Roma	—	ICD	—	Army	—	O	—	—	—
San Cataldo Bari ..	16° 52' 00" E. 41° 08' 00" N.	ICQ	160	Government ..	600	Special ..	Central European time.[56] 8 a.m. to midnight	—	—
Spezia	12° 22' 00" E. 41° 53' 00" N.	ICS	—	Army	—	O	—	—	—
Taranto	17° 15' 05" E. 40° 28' 05" N.	ICT	—	Army	—	O	—	—	—
Torino	7° 40' 10" E. 45° 00' 20" N.	IGT	—	Army	—	—[148] ..	—	—	—
Treviso	12° 10' 26" E. 45° 30' 53" N.	IGV	—	Army	—	—[148] ..	—	—	—
Venezia	12° 21' 15" E. 45° 29' 00" N.	ICZ	—	Army	—	O	—	—	—
Villa San Giovanni ..	Calabria, Strait of Messina 15° 38' 00" E. 38° 10' 00" N.	IFV	27	Government (State Railways)	50	O [109]	—	—	—
Vittoria Radio	Sicily, Province of Syracuse 14° 31' 50.7" E. 36° 56' 50.7" N.	ICV	270	Government ..	300, 600	P G [16]	N	0.30	—
JAPAN									
Choshi	Hondo, Inuboye Point 140° 51' 12" E. 35° 44' 08" N.	JCS	By day, 450; by night, 1,500	Ministry of Communications	300, 600, 1,800	P G [113] [252] ..	N	0.60 [114]	—[114]
Dairenwan	Peninsula of Kwan-tung 121° 53' 15" E. 38° 57' 50" N.	JDA	By day, 350; by night, 1,200	—	300, 600	P G [252]	N	0.60 [114]	—[114]
Fukkikaku	Island of Formosa, Formosa Strait 121° 32' 00" E. 25° 18' 00" N.	JFK	By day, 400; by night, 1,200	Ministry of Communications	300, 600	P G [252]	N	0.60 [114]	—[114]
Funabashi..	Near Tokio	—	—	Ministry of Communications	—	P G [87] O ..	—	—	—

Land Stations—*Continued*

Name.	Geographical Position	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type.	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
JAPAN—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Komonto [205]	Chosen, Island Komonto 126° 36′ 12″ E. 34° 05′ 55″ N.	JKM	By day, 200 by night, 300	—	—	—[194] ..	N	—	—
Mokpo [205]	Chosen, port of Mokpo 126° 23′ 05″ E. 34° 47′ 03″ N.	JMP	By day, 200; by night, 300	—	—	—[194] ..	N	—	—
Osezaki	Kyushyu, Goto Islands 128° 37′ 08″ E. 32° 37′ 20″ N.	JOS	By day, 450; by night, 1 500	Ministry of Communications	300, **600** 1,800	P G	N	0.60 [114]	— [114]
Otchishi	Hokkaïdo, Pacific coast 145° 30′ 20″ E. 43° 10′ 17″ N.	JOC	By day, 450; by night, 1,500	Ministry of Communications	300, **600**	P G	N	0.60 [114]	— [114]
Rasajima	Rasa Island, 131° 13′ 00″ E. 24° 29′ 30″ N.	JSA	By day, 450; by night, 1,300	Ministry of Communications	300, **600**, 1,800	P R [265]	—	—	—
Shimotsui	Inland Sea, 133° 48′ 05″ E. 34° 26′ 30″ N.	JSX	By day, 300; by night, 1,000	Ministry of Communications	300, **600**, 1,800	P G	N	0.60 [114]	— [114]
Shiomisaki	Hondo, Kii Channel 135° 46′ 08″ E. 33° 25′ 32″ N.	JSM	By day, 250; by night, 1,000	Ministry of Communications	300, **600**	P G	N	0.60 [114]	— [114]
Shogetsubito [205]	Chosen, port of Chemulpo 126° 36′ 20″ E. 37° 28′ 19″ N.	JSB	By day, 200; by night, 300	—	—	—[194] ..	N	—	—
Shoseito [205]	Chosen, Island of Shoseito 124° 43′ 45″ E. 37° 45′ 36″ N.	JSS	By day, 300; by night, 400	—	—	—[194] ..	N	—	—
Tsunoshima	Hondo, near Shimonoseki [illegible]	JTS	By day, 200; by night, 800	Ministry of Communications	300, **600**	P G	N	0.60 [114]	— [114]

LIBERIA									
Monrovia FMA	10° 49' 36" W. of Greenwich 13° 09' 50" W. of Paris 6° 16' 40" N.	FMA	By day, 280; by night, 550	French Government	600	P G [73]	Sunrise to sunset	—	—
Monrovia KAB	10° 48' 42" W. 6° 18' 26" N.	KAB	By day, 320; by night, 650	Deutsch-Südamerikanische Telegraphengesellschaft, Cologne	600	P G	Greenwich time 7 a.m. to midday, 11 p.m. to 1 a.m.	—	—
MADAGASCAR									
Diégo-Suarez	North of Madagascar 49° 22' 45" E. of Greenwich 47° 02' 31" E. of Paris 12° 15' 04" S.	FDG	By day, 325; by night, 650	—	600	P G [115 195], O ..	Third time-belt east of Greenwich belt 7 a.m. to 11 a.m. 1.30 p.m. to 5 p.m., 7 p.m. to 9 p.m.	0.50	—
Dzaoudzi	Mayotta Island (Comoro Islands) 45° 16' 29" E. of Greenwich 42° 56' 15" E. of Paris 12° 46' 55" S.	FDO	430	French Government	600	P G [116 195] ..	7 a.m. to 11 a.m., 1.30 p.m. to 5 p.m., 7 p.m. to 9 p.m.	0.50	—
Majunga	Mozambique Channel 46° 20' 14" E. of Greenwich 44° 00' 00" E. of Paris 15° 43' 00" S	FJA	430	French Government	600	P G [115 195] ..	7 a.m. to 11 a.m., 1.30 p.m. to 5 p.m., 7 p.m. to 9 p.m.	0.50	—
MALTA									
Malta Island [297]	14° 29' 24" E. 35° 55' 17" N.	VPT	200	Eastern Telegraph Co.	300, 600	P G	N [269]	0.30	—
Malta, Rinella Bay ..	14° 32' 00" E. 35° 53' 00" N.	BYZ	—	British Navy ..	—	O	—	—	—
Malta, S. Angelo ..	14° 31' 00" E 35° 53' 00" N.	BYY	—	British Navy ..	—	O	—	—	—
MARIANNE ISLANDS									
Guam [256]	144° 44' 08" E. 13° 27' 12" N.	NPN	100	U.S. Navy ..	300, 600	P G	N	0.25 [253]	2.50 [253]
MARSHALL ISLANDS									
Nauru	166° 56' 23" E. 0° 25' 43" S.	—	—	—	—	P G [300] (g) ..	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
MEXICO	Meridian of Greenwich.						Mean time of the meridian of Tacubaya [121]	Francs.	Francs.
Campeche	90° 34′ 36″ W. of Greenwich 8° 35′ 24″ E. of Tacubaya 19° 51′ 40″ N.	XAB	300	—	600, 750, **900**, 1,180	P G [119] [120] ..	8 a.m. to 10 p.m.	0.30	3.00
Guaymas	Sonora 110° 58′ 00″ W. of Greenwich 11° 48′ 00″ W. of Tacubaya 27° 55′ 30″ N.	XAH	300	—	600, 750, **900**, 1,180	P G [120]	8 a.m. to 7 p.m.	0.30	3.00
Isla Maria Madre	106° 35′ 25″ W. of Greenwich 7° 25′ 25″ W. of Tacubaya 21° 37′ 11″ N.	XAD	300	—	600, 750, **900**, 1,180	P G [118] ..	8 a.m. to 7 p.m.	0.30	3.00
Mazatlán de Sinaloa ..	Sinaloa 106° 29′ 00″ W. of Greenwich 7° 19′ 00″ W. of Tacubaya 23° 16′ 00″ N.	XAE	180	—	600, **900**	P G [118] [120] ..	8 a.m. to 7 p.m.	0.30	3.00
Payo Obispo	Quintana Roo 88° 25′ 00″ W. of Greenwich 10° 45′ 00″ E. of Tacubaya 18° 33′ 00″ N.	XAC	300	—	600, 750, 900, **1,180**	P G [120]	8 a.m. to 10 p.m.	0.30	3.00
S. José del Cabo	South coast of Lower California 109° 42′ 00″ W. of Greenwich 10° 32′ 00″ W. of Tacubaya 23° 03′ 00″ N.	XAF	180	—	600, **900**	P G [118] ..	8 a.m. to 7 p.m.	0.30	3.00
S. Rosalia de la Baja, California	Lower California 112° 20′ 00″ W. of Greenwich [illegible] W.	XAG	80	—	**600**	P G [118] ..	8 a.m. to 7 p.m.	0.30	3.00

S. Rosalia de la Baja, California	of Tacubaya 20° 57′ 16″ N.								
Veracruz de Veracruz	96° 07′ 16″ W. of Greenwich 3° 02′ 44″ E. of Tacubaya 19° 10′ 50″ N.	XAA	300	—	600, 750, 900, 1,180	P G [18] [120] ..	8 a.m. to 10 p.m.	0.30	3.00
MONTENEGRO									
Antivari	42° 08′ 00″ N. 19° 07′ 00″ E.	—	—	Compagnia di Antivari	—	—	—	—	—
MOROCCO							Greenwich time.		
Casablanca, Maroc ..	7° 37′ 00″ W. of Greenwich 9° 57′ 00″ W. of Paris 33° 36′ 30″ N.	CNP	430	—	300, **600**	P G	6 a.m. to midnight	0.25[5] (r)	—
Mogador	9° 46′ 00″ W. of Greenwich 12° 06′ 00″ W. of Paris 31° 31′ 00″ N.	CNY	430	—	300, **600**	P G	6 a.m. to midnight.	0.25[d] (s)	—
Rabat	6° 50′ 30″ W. of Greenwich 9° 10′ 30″ W. of Paris 34° 02′ 15″ N.	CNF	110	—	450	O	6 a.m. to 7 a.m., 6 p.m. to 7 p.m.	—	—
Tanger	5° 49′ 00″ W. of Greenwich 8° 09′ 00″ W. of Paris 35° 47′ 15″ N.	CNW	430	—	300, **600**	P G	6 a.m. to midnight.	0.25 [35](t)	—
NAVASSA ISLAND									
Navassa Island [243] ..	Windward Passage 74″ 52′ 00″ W. 18° 30′ 00″ N.	WQN	—	Snare and Triest Co.	**600**, 750	— [229]	X	—	—
NEW BRITAIN									
Rabaul	—	—	—	Australian Govt.	—	P G [300] (k) ..	—	—	—
NEW CALEDONIA									
Nouméa-Sémaphore ..	166° 27′ 32.07″ E. of Greenwich 164° 07′ 18.07″ E. of Paris 22° 16′ 12″ S.	FQN	By day 400	—	300, **600**	P G [266] ..	Local time: 10 a.m. to 11 a.m., 2 p.m. to 3 p.m., 5 p.m. to 6 p.m., 8 p.m. to midnight.	**0.40** [267]	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
NEW IRELAND	Meridian of Greenwich.							Francs.	Francs.
Kawieng	—	—	—	Australian Govt.	—	P	—	—	—
NEW ZEALAND							Mean time of New Zealand [132]		
Awanui Radio	Auckland, Mongonui 173° 18′ 00″ E. 34° 54′ 00″ S.	VLA	By day, 300; by night, 600	Government ..	300, **600**, 1,800, 2,500, 3,500	P G [123] ..	6.30 p.m. to midnight [201]	0.57.8 [117 123 200]; 0.26.3 [123 199 200]	—
Awarua Radio	Otago, near Bluff Harbour 168° 23′ 00″ E. 46° 30′ 00″ S.	VLB	By day, 300; by night, 600	Government ..	300, **600**, 2,000, 2,500 3,500	P G [123] ..	6.30 p.m. to midnight [201]	0.57.8 [117 123 200]; 0.26.3 [123 199 200]	—
Chatham Islands ..	176° 57′ 00″ W. 43° 57′ 00″ S.	VLC	300	Government ..	300, **600**	P G [123]	9 a.m. to 1 p.m., 3 p.m. to 5 p.m., 7 p.m. to midnight	0.57.8 [117 123 200 202]; 0.26.3 [123 199 200 202]	—
Wellington Radio ..	174° 46′ 39″ E. 41° 17′ 05″ S.	VLW	325	Government ..	300, **600**	P G [123]	N	0.57.8 [117 123 200]; 0.26.3 [123 199 200]	—
NIGERIA									
Lagos	3° 23′ 55″ E. 6° 26′ 35″ N	VPY	250	African Direct Telegraph Co., Ltd.	300, **600**	P G	Greenwich time: 7 a.m. to 9 p.m.; Sundays: 8 a.m. to 10 a.m., 4 p.m. to 6 p.m.	0.60	—
NORTH BORNEO							Hong Kong zone time		
Sandakan ..	118° 07′ 00″ E. 5° 50′ 00″ N.	VQB	400	—	300, **600**	P G [203] ..	8 a.m. to 11 a.m., 2 p.m. to 5 p.m. (8 p.m. to 10 p.m.)[204]	0.40	—
NORWAY							Central European time [56]		

Flekkerö	Skager Rak, near 7° 59′ 00″ E. 58° 04′ 05″ N.	[illegible]	[illegible] night, 50						
Ingö Radio	To the west of North Cape 24° 09′ 20″ E. 71° 04′ 25″ N.	LEI	480	—	600	P G	N,[127] 8 a.m. to 9 p.m.[128]	0.20	2.00
Karljohansvern	Christiania Fiord	LBZ	—	—	—	O	—	—	—
Röst	Lofoden Islands 12° 04′ 45″ E. 67° 30′ 24″ N.	LFR	35	—	600	P G[131] ..	9 a.m. to 1 p.m., 4 p.m. to 7.30 p.m. Holidays: 8 a.m. to 10 a.m.	0.14	1.40
Sörvaagen	Lofoden Islands 13° 02′ 00″ E. 67° 53′ 30″ N.	LEN	35	—	600	P G[131] ..	9 a.m. to 1 p.m., 4 p.m. to 7.30 p.m. Holidays: 8 a.m. to 10 a.m.	0.14	1.40
Spitsbergen	Green Harbour 14° 14′ 27″ E. 78° 02′ 26″ N.	LFG	480	—	600	P G	N,[129] 8 a.m. to 9 p.m.[130]	0.20	2.00
Stavanger[13]	5° 45′ 00″ E. 58° 58′ 00″ N.	—	—	—	—	—	—	—	—
Tjömö	Christiania Fiord 10° 24′ 05″ E. 59° 03′ 05″ N.	LET	By day, 160; by night, 50	—	600	P G	N[126]	0.14	1.40
PANAMA									
Balboa[256]	Pacific Entrance of the Panama Canal 79° 33′ 30″ W. 8° 57′ 00″ N.	NPJ	200	U.S. Navy ..	600	P G	N	0.30[253]	3.00[253]
Colon[256]	Atlantic Entrance of the Panama Canal 79° 54′ 07″ W. 9° 22′ 08″ N.	NAX	400	U.S. Navy ..	600	P G	N	0.30[253]	3.00[253]
Darien, Panama[256] ..	79° 46′ 40″ W. 9° 07′ 20″ N.	NBA	1 000	U.S. Navy ..	—	O	N	—	—
PERU	Meridian of Paris							Sols. Peruvian	Sols. Peruvian
Cachendo	—	OAB	By day, 650; by night, 1,800	Government ..	600, 3,500	P G	—[79]	0.14[298]	—[298]
Callao	79° 28′ 34″ W. 12° 03′ 53″ S.	OAA	By day, 180; by night, 480	Government ..	600	P G	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12[298]	—[298]

O 2

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
PERU—*contd.*	Meridian of Paris.							Sols Peruvian	Sols Peruvian
Chala	76° 38′ 49″ W. 15° 49′ 20″ S.	OAC	By day, 240; by night, 600	Government	600, 760	P G	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 [29]	— [298]
Ilo	73° 40′ 44″ W. 17° 36′ 50″ S.	OAL	By day, 240; by night, 600	Government	600, 730	P G	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 [298]	— [298]
Iquitos [192]	75° 36′ 56″ W. 3° 45′ 57″ S.	OAY	By day, 900; by night, 2,400	Government	600, 1,500, 2,000, 2,500, 3,000, 3,500	P G	8 a.m. to midnight.	0.24 [298]	— [298]
Masisea [192]	76° 40′ 50″ W. 8° 35′ 48″ S.	OAM	240	Government	2,000	P G	6 a.m. to 5 p.m.	0.24 [298]	— [298]
Orellana [192]	77° 31′ 15″ W. 6° 54′ 55″ S.	OAO	240	Government	2,000	P G	6 a.m. to 5 p.m.	0.24 [298]	— [298]
Pisco	78° 32′ 38″ W. 13° 42′ 40″ S.	OAP	By day, 180; by night, 480	Government	600	P G	8 a.m. to noon, 2 p.m. to 5 p.m., 7 p.m. to 10 p.m.	0.12 [298]	— [298]
Putumayo [192]	—	OAU	600	Government	2,000	P G	7 p.m. to midnight.	0.24 [298]	— [298]
Puerto Bermudez [192]	77° 17′ 45″ W. 10° 18′ 00″ S.	OAE	240	Government	2,000	P G	6 a.m. to 5 p.m.	0.24 [298]	— [298]
Requena [192]	76° 13′ 06″ W. —	OAQ	240	Government	2,000	P G	6 a.m. to 5 p.m.	0.24 [298]	— [298]
San Cristóbal (Lima)	79° 22′ 54″ W. 12° 03′ 06″ S.	OAZ	By day, 900; by night, 2,400	Government	600, 1,500 2,000, 3,000, 3,500, 4,000	P G	8 a.m. to midnight	0.12 [298]	— [298]
PHILIPPINE ISLANDS	Meridian of Greenwich.						Mean time of the meridian 120° east of Greenwich. N	Francs.	Francs.
Cavite [256]	120° 55′ 00″ E. 14° 28′ 55″ N.	NPO	150	U.S. Navy	—	O		— [253]	— [253]
Cuyo [259]	121° 00′ 20″ E. 10° 51′ 25″ N.	WVX	150	Government	**600**, 1,200	O	7 a.m. to 6.15 p.m.	—	—
Dav[illegible]	Mindanao [illegible]	WVO	200	Government	**600**, 1,200	O	7 a.m. to 6 p.m.	—	—

	El Fraile Island 120° 37′ 43″ E. 14° 18′ 23″ N.										
Fort Frank[255]	Manila Bay, Carabao Island 120° 36′ 45″ E. 14° 16′ 20″ N.	WVL	50	U.S. Army ..	—	O	..	..	—	—	—
Fort Hughes[255]	Manila Bay, Caballo Island	WVM	50	U.S. Army ..	—	O	..	..	—	—	—
Fort Mills WVN[214] ..	Manila Bay 120° 34′ 40″ E. 14° 22′ 52″ N.	WVN	1,000	U.S. Army ..	300, **600**	P G	..	..	6 a.m. to 10 p.m.	0.30	3.00
Fort Mills WVZ[255] ..	Manila Bay Corregidor Island. 120° 34′ 40″ E. 14° 22′ 52″ N.	WVZ	35	U.S. Army ..	600, **825**	O	..	..	6 a.m. to 10 p.m.	—	—
Fort Wint[255]	Manila Bay, Grande Island 120° 13′ 25″ E. 14° 46′ 15″ N.	WVR	50	U.S. Army ..	—	O	..	..	—	—	—
Fort Wm. McKinley[255] ..	Luzon 121° 03′ 00″ E. 14° 33′ 40″ N.	WVQ	50	U.S. Army	600	O		..	—	—	—
Isabela de Basilan ..	—	BN	30	—	—	P G	..	..	8 a.m. to 5.30 p.m.	—	—
Jolo[259]	Jolo Island 121° 00′ 00″ E. 6° 02′ 40″ N.	WVS	200	Government	600	P G	..	..	7 a.m. to 5.15 p.m.	—	—
Malabang[259]	Mindanao 124° 04′ 10″ E. 7° 35′ 20″ N.	WVT	200	Government	600, **1,200**	P G	..	..	7 a.m. to 7.30 p.m.	—	—
Manila[255]	Luzon 120° 58′ 47″ E. 14° 35′ 48″ N.	WVU	200	U.S. Army ..	600	O	..	..	—	—	—
Olongapo[258]	120° 16′ 57″ E. 14° 49′ 26″ N.	NPT	200	U.S. Navy ..	—	O	..	..	N	—[253]	—[258]
Puerto Princesa[259] ..	Paragua 118° 42′ 40″ E. 9° 44′ 00″ N.	WVV	150	Government	**600**, 1,200	P G	..	..	7 a.m. to 6 p.m.	—	—
San José, Mindoro[259] ..	121° 03′ 00″ E. 12° 27′ 30″ N.	WVY	200	Government	600	P G	..	..	7 a.m. to 6.15 p.m.	—	—
Zamboanga[259]	Mindanao 122° 02′ 19″ E. 6° 55′ 10″ N.	WVW	400	Government	600, **1,200**	P G	..	..	7 a.m. to 7.30 p.m.	—	—
PORTO RICO											
Ensenada, Porto Rico ..	66° 57′ 00″ W. 17° 59′ 00″ N.	WPR	150	Guanica Centrale	300, **600**, 1,610	P G	..	..	Mean time of the meridian 75° west of Greenwich: 8 a.m. to midday, 2 p.m. to 5 p.m. Sundays: 9 a.m. to midday.	0.30	3.00

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge
PORTO RICO—*contd.*									
San Juan, Porto Rico [256]	Meridian of Greenwich. 66° 05′ 38″ W. 18° 28′ 04″ N.	NAU	200	U.S. Navy	600	P G	N	Francs. 0.30	Francs. 3.00
PORTUGAL									
Corvo	Azores 31° 07′ 35″ W. 39° 40′ 10″ N.	CRE	65	Government	300, **600**	— [150]	— [124]	—	—
Faial	Azores 28° 44′ 10″ W. 38° 38′ 00″ N.	CRC	130	Government	300, **600**	P G [132]	N	0.60	—
Flores	Azores 31° 08′ 10″ W. 39° 27′ 35″ N.	CRD	130	Government	300, **600**	P G [132]	N	0.60	—
Lisbon CRF	9° 08′ 20″ W. 38° 42′ 18″ N.	CRF	190	Government	300, 450, **600**	P G	N	0.40	—
Lisbon		—	—	—	—	P G, O.	—	—	—
Oporto	—	—	—	Government	—	—	—	—	—
Santa Maria	Azores 25° 08′ 20″ W. 36° 59′ 55″ N.	CRB	65	Government	300, **600**	P G [132]	N	0.60	—
San Miguel	Azores 25° 42′ 50″ W. 37° 44′ 30″ N.	CRA	65	Government	300, **600**	P G [132]	N	0.60	—
PORTUGUESE EAST AFRICA									
Lourenço Marques	Province of Mozambique 32° 35′ 39″ E. 25° 58′ 05″ S.	CRZ	100	—	300, **600**	P G	Mean time of the meridian 30° east of Greenwich: 8 a.m. to 11 a.m., 2 p.m. to 5 p.m.	0.60	—
ROUMANIA									
Constantza-Tunnel	28° 39′ 03″ E. of Greenwich 26° 19′ 10″ E. of [illegible]	CVS	240	State Maritime Service	600	P R [133]	N, during the voyages of the Roumanian ships	0.15	1.50

RUSSIA							Time of Petrograd, 2 hours in advance of Greenwich time		
Anadyr	Behring Sea 175° 35′ 00″ E. 64° 34′ 00″ N.	RNR	130	—	300. 420. 600	P G	11 a.m. to 7 p.m.	0.60	—
Arkhangel..	Mouth of the Dwina 40° 30′ 00″ E. 64° 32′ 00″ N.	RQA	250	—	300, 420, 600	P G	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight	0.60 [139]	— [139]
Batoum	Black Sea 41° 40′ 00″ E. 41° 36′ 00″ N.	REI	—	—	—	O	—	—	—
Fort d'Alexandrovsk ..	Coast of the Caspian Sea 50° 16′ 40″ E. 44° 30′ 14″ N.	RNF	160	—	300, 420, 600	P G	5.50 a.m. to 9.50 a.m., 11.50 a.m. to 3.50 p.m.	0.60	—
Hapsal	Esthonia 23° 48′ 00″ E. 59° 00′ 00″ N.	REC	—	—	—	O	—	—	—
Helsingfors	24° 57′ 00″ E. 60° 27′ 00″ N.	REB	—	—	360	O	—	—	—
Kerbinskaïa	River Amgoun, a tributary of the Amur 136° 29′ 18″ E. 52° 20′ 07.3″ N.	RPN	170	—	—	— [135]	X	—	—
Kerch	Crimea 36° 27′ 00″ E. 45° 18′ 00″ N.	REH	—	—	—	O	—	—	—
Kronstadt..	29° 47′ 00″ E. 59° 59′ 00″ N.	REA	—	—	360	O	—	—	—
Libau RED	21° 05′ 00″ E. 56° 30′ 00″ N.	RED	—	—	360	O	—	—	—
Libau ROL	Baltic Sea 20° 50′ 00″ E. 56° 31′ 40″ N.	ROL	170	—	300, 420, 600	P G	6 a.m. to 10 p.m.	0.60	—
Mare-Sale	Kara Sea, Yalmal Peninsula 66° 48′ 38″ E. 69° 42′ 59″ N.	RTM	150	—	300, 420, 600	P G	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight.	0.60 [139]	— [139]
Moscow	—	—	—	Government ..	—	—	—	—	—
Naiakhan	Sea of Okhotsk 159° 59′ 00″ E. 61° 33′ 00″ N	RNN	130	—	300, 420, 600	P G	11 a.m. to 7 p.m.	0.60	—
Nicolaiewsk RAU ..	On the Amur	RAU	—	—	—	O	—	—	—
Nicolaiewsk RNL ..	Mouth of the Amur 140° 42′ 54.4″ E. 53° 08′ 19.3″ N.	RNL	240	—	300, 600	P G [136] ..	N	0.60	—
Odessa	—	RAR	—	—	—	O	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
RUSSIA—*contd.*	Meridian of Greenwich.						Time of Petrograd, 2 hours in advance of Greenwich time	Francs.	Francs.
Okhotsk	Sea of Okhotsk 143° 20′ 00″ E. 59° 22′ 00″ N.	ROT	130	—	300, 420, **600**	P G	5 a.m. to 9 p.m.	0.60	—
Pétropavlovsk	Kamchatka 158° 38′ 45″ E. 53° 00′ 10″ N.	RPK	240	—	300, **600**	P G	N	0.60	—
Petrograd	—	—	—	Government ..		—	—	—	—
Pétrowsk Daghestan ..	Coast of the Caspian Sea 47° 30′ 00″ E. 42° 59′ 20″ N.	ROK	160	—	300, 420, **600**	P G	5.50 a.m. to 9.50 a.m., 11.50 a.m. to 3.50 p.m.	0.60	—
Presté	Aland Islands 20° 21′ 00″ E. 60° 16′ 00″ N.	REF	—	—	360	O	—	—	—
Rade d'Astrakhan ..	Caspian Sea 47° 25′ 00″ E. 45° 15′ 00″ N.	RQT	110	—	300, 420, **600**	P G	5.50 a.m. to 9.50 a.m., 11.50 a.m. to 3.50 p.m. [138]	0.13	—
Rade de Taganrog ..	Sea of Azov 38° 14′ 10″ E. 46° 59′ 50″ N.	ROE	110	—	300, 420, **600**	P G [140]	6 a.m. to 10 p.m.	0.60 [139] [140]	— [139] [140]
Reval .. .. :	24° 15′ 00″ E. 59° 20′ 00″ N.	ROR	170	—	300, 420, **600**	P G	6 a.m. to 10 p.m.	0.60	—
Riga	24° 06′ 15″ E. 56° 59′ 53″ N.	RRG	160	—	300, 420, **600**	P G [137]	6 a.m. to 10 p.m.	0.60	—
Rouno	Gulf of Riga 23° 15′ 40″ E. 57° 48′ 00″ N	RRN	70	—	300, 420, **600**	P G	8 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 9 p.m.	0.60	—
Sébastopo	33° 33′ 00″ E. 44° 37′ 00″ N.	REG	—	—	360	O	—	—	—
Taganrog	Sea of Azov 38° 48′ 00″ E. 47° 12′ 00″ N.	RRT	170	—	300, 420, **600**	P G [140] ..	6 a.m. to 10 p.m.	0.60 [139] [140]	— [139] [140]
Vaigatch	Vaigatz Island Kara Strait 58° 48′ 00″ E. 70° 23′ 46″ N.	RTV	150	—	300, 420, **600**	P G	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight.	0.60 [139]	— [139]
Vladivostok RAS ..	131° 54′ 00″ E. 43° 06′ 00″ N. 43 06 49.2 N	RAS	—	—	1,200 approximately	O	—	—	—

Wiborg	[illegible]	[illegible]			mately				
Yougorski-Char	Kara Sea, Jugor Strait 60° 45′ 42″ E. 69° 49′ 07″ N.	RTU	150	—	300, 420, **600**	P G	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to midnight.	0.60 [189]	— [189]
SAMOA ISLANDS									
Apia	—	VMG	—	—	300, **600**	P G [300] (a) ..	—	—	—
Tutuila [256]	—	NPU	—	U.S. Navy ..	600	P G	—	0.25	2.50
SIAM									
Bangkok	100° 32′ 00″ E. 13° 44′ 30″ N.	HGA	By day, 300; by night, 600	—	300, **600**, 1,600, 1,800	O	—	0.40	4.00
Singora	Gulf of Siam, Malay Peninsula 100° 38′ 00″ E. 7° 12′ 00″ N.	HGB	By day, 300; by night, 600	—	300, **600**, 1,600, 1,800	O	—	0.40	4.00
SIERRA LEONE									
Sierra Leone	13° 14′ 00″ W. 8° 30′ 00″ N.	VPU	250	African Direct Telegraph Co., Ltd. ..	300, **600**	P G	Greenwich time: 7 a.m. to 9 p.m. Sundays: 8 a.m. to 10 a.m., 4 p.m. to 6 p.m.	0.60	—
SOLOMON ISLANDS									
Kieta	Bougainville Island	—	—	Australian Govt.	—	P G [300] (c) ..	—	—	—
Tulagi	Florida Island	—	—	Australian Govt.	—	P G [300] (l) ..	—	—	—
SOUTH AFRICA (UNION OF)									
Capetown	18° 19′ 00″ E. 34° 09′ 00″ S.	VNC	350	Government ..	300, **600**	P G [141] [111] ..	N	0.60	—
Durban	31° 03′ 50″ E. 29° 52′ 40″ S.	VND	250	Government ..	300, **600**	P G [141]	N	0.60	—
SPAIN (a) Mother-Country									
Almeria	2° 31′ 15″ W. 36° 51′ 00″ N.	EGA	220	Army	600, **900**	O	N	—	—
Aranjuez	3° 40′ 32″ W. 40° 01′ 48″ N.	EAA	430	Compania Nacional de T.S.H.	300, **600**, 2,130	P G	N	0.45	4.50
Barcelona EAB	2° 06′ 28″ E. 41° 18′ 42″ N.	EAB	430	Compania Nacional de T.S.H.	300, **600**, 2,300	P G	N	0.45	4.50
Barcelona EGE	2° 03′ 52″ E. 41° 23′ 08″ N.	EGE	430	Army	600, 1,000, 1,600	O	N	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
SPAIN								Francs.	Francs.
(a) **Mother Country**—*contd.*	Meridian of Greenwich.						Greenwich time		
Bilbao	2° 55′ 34″ W. 43° 23′ 53″ N.	EGH	320	Army	600, 1,200, 1,600	O	N	—	—
Cabo de Palos	Murcia 0° 40′ 00″ W. 37° 38′ 00″ N.	EAP	202	Compania Nacional de T.S.H.	300, **600**, 1,800	P G	N	0.45	
Cabo Finisterre [145] ..	9° 16′ 18″ W. 42° 52′ 40″ N.	EAF	210	Compania Nacional de T.S.H.	300, **600**, 1,800	P G	N	0.45	4.50
Cabo Mayor	Santander 3° 48′ 30″ W. 43° 30′ 00″ N.	EAS	108	Compania Nacional de T.S.H.	300, **600**, 1,800	P G	N	0.45	4.50
Cádiz	6° 17′ 42″ W. 36° 31′ 30″ N.	—	6	—	70	P [143]	—	—	—
Cádiz EAC	6° 16′ 14″ W. 36° 29′ 45″ N.	EAC	860	Compania Nacional de T.S.H.	300, **600**, 2,540	P G	N	0.45	4.50
Cartagena	0° 59′ 18″ W. 37° 35′ 36″ N.	EBX	210	Army	600, 900, 1,000, 1,200, 1,600	O	N	—	—
Coruña	8° 24′ 13″ W 43° 24′ 29″ N.	EGJ	430	Army	600, 1,200, 1,600	O	N	—	—
Guadalajara	3° 10′ 09″ W. 40° 37′ 54″ N.	EGZ	54	Army	900	O	X	—	—
Huelva	—	—	—	Compania Nacional de T.S.H.	—	—	—	—	—
Las Palmas	15° 22′ 10″ W. 28° 00′ 00″ N.	EAL	860	Compania Nacional de T.S.H.	300, **600**, 2,540	P G	N	0.45	4.50
Le Ferrol [13]	8° 14′ 05″ W. 43° 28′ 52″ N.	EBW	440	Army	600, 900, 1,200 1,600, 1,800	O	N	—	—
Madrid EBZ	3° 43′ 00″ W. 40° 25′ 00″ N.	EBZ	15	Navy	225, 300	O	N	—	—
Madrid EGC	3° 50′ 30″ W. 40° 24′ 30″ N.	EGC	540	Army	600, 900, 1,600, 2,000, 2,500	O	N	—	—
Mahon	Minorca 4° 22′ 39″ E. 39° 52′ 29″ N.	EGI	320	Army	600, 1,200, 1,600	O	N	—	—
Malaga	—	—	—	Compania Nacional de T.S.H.	—	P G	—	—	—
Matagorda	Gulf of Cadiz 6° 14′ 54″ W. 36° 31′ 30″ N.	—	6	—	70	P [143]	—	—	—
San Fernando Cádiz ..	—	EBY	—	—	—	O	N	—	—
Sóller	Majorca 2° 45′ 40″ E.	EAO	270	Compania Nacional de T.S.H.	300, **600**	P G	N	0.45	4.50

	[illegible] 00″ W. 28° 28′ 30″ N.	[illegible]	[illegible]	Compania Nacional de T.S.H.	300, 600, 2,540	P G	N	0.45	4.50
Valencia	0° 22′ 46″ W. 39° 27′ 10″ N.	EGG	320	Army	600, 1,200 1,600	O	N	—	—
Vigo	8° 40′ 00″ W. 42° 15′ 00″ N.	EAV	430	Compania Nacional de T.S.H.	300, **600**, 2,900	P G	N	0.4	
(b) Morocco									
Ceuta	5° 16′ 24″ W. 35° 48′ 40″ N.	EGD	320	Army	600,1,200,1,500	O	N	—	—
Larache	6° 12′ 00″ W. 35° 12′ 00″ N.	EGF	220	Army	600, 900, 1,200	O	N	—	—
Melilla	2° 56′ 25″ W. 35° 18′ 15″ N.	EGB	320	Army	600,1,200,1,600	O	N	—	—
(c) In the Gulf of Guinea.									
Santa Isabel de Fernando Póo	8° 48′ 40″ E. 3° 46′ 00″ N.	EAY	130	Government ..	300, **600**, 1,800,	P G [146] ..	Local time: 6 a.m. to 9 a.m., 7 p.m. to 10 p.m.	0.55 [147]	5.50 [147]
SWEDEN									
Gothenburg (Göteborg) ..	11° 53′ 46″ E. 57° 41′ 05″ N.	SAB	350	Government ..	300, **600**	P G	N	0.14	1.40
Härnösand	—	SAH	—	Government ..	300, **600**	P G	N	0.14	1.40
Karlskrona	15° 35′ 30″ E. 56° 09′ 10″ N.	SAA	420	Marine Dept. ..	300, **600**	P G	N	0.14	1.40
Oscar-Fredriksborg ..	Near Stockholm 18° 26′ 42″ E. 59° 23′ 48″ N.	SAD	50	Marine Dept. ..	300, **600**	P G	—	0.14	1.40
Tingstäde	Gothland 18° 35′ 30″ E. 57° 43′ 50″ N.	SAE	420	Marine Dept. ..	300, **600**	P G	—	0.14	1.40
Trälleborg..	13° 09′ 45″ E. 55° 22′ 10″ N.	SAC	250	State Railways ..	300, **375**, 600	P R [83] O [149] ..	N	0.14	1.40
Vaxholm	18° 22′ 36″ E. 59° 24′ 18″ N.	SAF	350	—	300, **600**	P G	N	0.14	1.40
TUNIS									
Bizerte	In Sidi Abdallah 9° 49′ 00″ E. of Greenwich 7° 29′ 00″ E. of Paris 37° 16′ 00″ N.	FUA	—	French Navy ..	—	O	Central European time.[56] 9 a.m. to midnight.	—	—
Cap Bon	11° 02′ 23″ E. of Greenwich 8° 42′ 23″ E. of Paris 37° 04′ 48″ N.	FFT	100	French Navy ..	300, 600	P G [264] ..	7 a.m. to 10 p.m.	0.40 [61]	— [61]
TURKEY									
Constantinople (Ok Meiddan)	—	—	—	—	—	—	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
UNITED STATES OF AMERICA	Meridian of Greenwich.							Francs.	Francs.
Akron, Ohio	81° 40′ 00″ W. 41° 10′ 00″ N.	WOI	350	Goodyear Tire & Rubber Co.	300, **600**, 2,000	—[26]	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 4.30 p.m.	—	—
Anderson, Virginia[170 281]	Fort Monroe	WZM	—	U. S. Army ..	—	O	—	—	—
Annapolis, Maryland[256] ..	Chesapeake Bay 76° 29′ 12″ W. 38° 59′ 00″ N.	NAK	100	U.S. Navy ..	—	O[160]	Mean time of the meridian 75° west of Greenwich: 8 a.m. to 10 p.m.	—[253]	—[253]
Ashtabula..	Ohio 80° 50′ 00″ W. 41° 50′ 00″ N.	WSA	125	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 7.30 a.m. to 11.30 a.m., 12.30 p.m. to 5 p.m.	0.15	1.50
Astoria, Oregon	123° 51′ 00″ W. 46° 11′ 00″ N.	KPC	300	Marconi Co. ..	300, **600**	P G[13] ..	N	0.30[158] 0.60[159]	3.00[158] 6.00[159]
Avalon, California ..	S. Catalina Island 118° 20′ 00″ W. 33° 21′ 00″ N.	KPI	200	Marconi Co. ..	300, 500, **600**	P R[144] ..	— Mean time of the meridian 120° west of Greenwich: 7 a.m. to 8 p.m.	0.10[218]	1.00[218]
Baltimore, Maryland ..	76° 36′ 41″ W. 39° 17′ 22″ N.	WBS	125	Marconi Co. ..	300, 450, **600**	P G	Mean time of the meridian 75° west of Greenwich: 6 a.m. to midnight	0.30	3.00
Beaufort, North Carolina[256]	76° 40′ 21″ W. 34° 43′ 12″ N.	NAN	100	U.S. Navy ..	—	O[160 161] ..	N	—[161 253]	—[161 253]
Beaumont, Texas ..	94° 07′ 00″ W. 30° 06′ 00″ N.	WOD	300	Magnolia Petroleum Co.	300, **600**	P G	Mean time of the meridian 90° west of Greenwich: 3 p.m. to 11 p.m.	0.30	3.00
Belmar	New Jersey 74° 02′ 00″ W. 40° 10′ 45″ N.	WII	—	Marconi Co. ..	—	Transatlantic Service	N	—	—
Benton Harbor	Michigan 86° 28′ 21″ W. 42° 06′ 42″ N.	WIZ	60	Graham & Morton Transportation Co.	300, 500, **600**	P R[43] ..	X	—	—
Binghamton	New York 75° 55′ 00″ W. 42° 08′ 00″ N.	WBT	150	Delaware, Lackawanna & Western Railroad Co.	1,610	—[221]	X	—	—

Bolinas, California ..	122° 43′ 33″ W. 37° 54′ 48″ N.	KET	3,500	Marconi Co. ..	6,100	— [220]	N	—	—
Boston NAD [256]	Massachusetts 71° 03′ 24″ W. 42° 22′ 24″ N.	NAD	200	U.S. Navy ..	—	O [160]	N	— [253]	— [253]
Boston WBF	Massachusetts 71° 03′ 40″ W. 42° 21′ 19″ N.	WBF	200	Marconi Co. ..	300, **600**	P G	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Brooklyn, New York ..	74° 00′ 23″ W. 40° 39′ 23″ N.	WCG	500	National Electric Signalling Co.	300, 550, **600**, 1,650, 2,000	P G	Mean time of the meridian 75° west of Greenwich: 4 a.m. to 8 a.m., 5 p.m. to 9 p.m.	0.15 [227] 0.30 [158] 0.60 [159]	1.50 [227] 3.00 [158] 6.00 [159]
Brownsville, Texas [255] ..	—	WUZ	250	Army	1,000	O	X	—	—
Buckroe [170] [281]	Virginia, Fort Monroe	WZL	—	U.S. Army ..	—	O	—	—	—
Buffalo, New York State	78° 52′ 36″ W. 42° 52′ 49″ N.	WBL	185	Marconi Co. ..	300, 500, **600**	P G	— [225]	0.15	1.50
Burrwood	Louisiana 89° 22′ 45″ W. 28° 58′ 04″ N.	W BW	400	Tropical Radio Tel. Co.	300, **600**, 2,200	P G [167]	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 7.5 a.m., 9 a.m. to 9.5 a.m., 11 a.m. to 11.5 a.m., 2 p.m. to 2.5 p.m., 4 p.m. to 4.5 p.m., 7 p.m. to 7.5 p.m. [280]	0.60	6.00
Calumet Michigan ..	88° 27′ 12″ W. 47° 15′ 12″ N.	WCM	150	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 1 p.m., 2 p.m. to 7 p.m., 8 p.m. to 1 a.m., 2 a.m. to 7 a.m.	0.15	1.50
Canton, Ohio	81° 22′ 00″ W. 40° 48′ 00″ N.	WQP	100	Henry L. Ley ..	50	— [48]	X	—	—
Cape Blanco [256]	Oregon 124° 33′ 30″ W. 42° 50′ 22″ N.	NPF	100	U.S. Navy ..	600	P G [160]	N	0.30	3.00
Cape Cod [256]	Massachusetts 70° 03′ 54″ W. 42° 02′ 22″ N.	NAE	100	U.S. Navy ..	—	O [160] [161] ..	N	— [161] [253]	— [161] [253]
Cape Hatteras	Buxton, N.C. 75° 31′ 21″ W. 35° 15′ 58″ N.	WHA	200	Marconi Co. ..	300, 550, **600**	P G [19]	N	0.30	3.00
Cape May	New Jersey entrance to Delaware Bay 74° 55′ 46″ W. 38° 55′ 50″ N.	WCY	150	Marconi Co. ..	300, 450, **600**	P G	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Carney's Point	New Jersey 75° 27′ 00″ W. 39° 43′ 00″ N.	WPO	100	E. I. du Pont de Nemours & Co.	300, 425 **600**	— [276]	X	—	—
Charleston, South Carolina [256]	79° 57′ 42″ W. 32° 51′ 38″ N.	NAO	200	U.S.Navy ..	600	P G [160] ..	N	0.30 [253]	3.00 [253]

Land Stations—*Continuea*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Chicago	Illinois 87° 37′ 30″ W. 41° 52′ 30″ N.	WGO	150	Marconi Co. ..	300, 450, **600**	P G [213] ..	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 6 p.m., 8 p.m. to 7 a.m.	0.15	1.50
Cleveland, Ohio	81° 41′ 13″ W. 41° 29′ 59″ N.	WCX	150	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 8 a.m. to midday, 12.30 p.m. to 7 p.m., 8 p.m. to 11 p.m., midnight to 7 a.m.[138]	0.15	1.50
Colorado Springs ..	Colorado 104° 50′ 00″ W. 38° 48′ 00″ N.	KIY	70	Herbert C. Colburn	300, **425**	— [276]	X	—	—
Conneaut Harbor ..	Lake Erie 80° 36′ 00″ W. 41° 57′ 00″ N.	WEV	220	Marquette & Bessemer Dock & Navigation Co.	300, 475, 540, **600**	P R [283] ..	X	0.15	1.50
Craftonville	California 117° 02′ 30″ W. 34″ 05′ 10″ N.	KJQ	250	Southern California Edison Co.	1,610	P	X	—	—
D.L. & W.R.R. Limited Train	—	WBI	—	Delaware, Lackawanna & Western Railroad Co.	—	—	—	—	—
Denver Colorado ..	105° 00′ 00″ W. 39° 45′ 00″ N.	KIX	100	William H. Smith	300, **575**	— [112]	X	—	—
Detroit, Michigan ..	83° 10′ 00″ W. 42° 20′ 00″ N.	WOK	300	Goodyear Tire & Rubber Co.	300, **600**, 2,160	— [276]	Mean time of the meridian 90° west of Greenwich: 8.30 a.m. to 4.30 p.m.	—	—
Diamond Shoals Lightship [256]	Off Cape Hatteras 75° 18′ 38″ W. 35° 05′ 08″ N.	NLB	60	U.S. Navy ..	—	O [160] [164] [165] ..	Mean time of the meridian 75° west of Greenwich: 6 a.m. to 10 p.m.[166]	— [253]	— [253]
Douglas, Arizona.. ..	109° 22′ 24″ W. 31° 20′ 41″ N.	KDC	100	Copper Queen Consolidated Mining Co.	**600**, 1,650	P	Mean time of the meridian 120° west of Greenwich: 10 a.m. to 11 a.m., 4 p.m. to 5 p.m.	—	—

Duluth, Minnesota	92° 07′ 10″ W. 46° 47′ 06″ N.	WDM	150	Marconi Co.	300, 500, 600	P G	Mean time of the meridian 90° west of Greenwich: 8 a.m. to midday 1 p.m. to 7 p.m. 8 p.m. to midnight, 1 a.m. to 7 a.m.	0.15	1.50
East San Pedro, California	118° 17′ 00″ W. 33° 44′ 00″ N.	KPJ	350	Marconi Co.	300, 500, 600	P G [215]	N	0.10 [101] 0.30 [158] 0.60 [159]	1.00 [101] 3.00 [158] 6.00 [159]
Eureka, California KPM	124° 11′ 00″ W. 40° 47′ 30″ N.	KPM	200	Marconi Co.	300, 530, 600	—	Mean time of the meridian 120° west of Greenwich: 8.30 a.m. to 6 p.m., 7.30 p.m. to 5 a.m.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Eureka, California NPW [256]	Table Bluff 124° 16′ 22″ W. 40° 41′ 44″ N.	N PW	200	U.S. Navy	600	P G [160 168]	N	0.30	3.00
Farallons [256]	California, to the west of S. Francisco 123° 00′ 04″ W. 37° 41′ 58″ N.	NPI	100	U.S. Navy	—	O [160]	N	— [253]	— [253]
Fire Island [256]	New York, south coast of Long Island 73° 13′ 08″ W. 40° 37′ 57″ N.	NAG	100	U.S. Navy	—	O [160]	N	— [253]	— [253]
Fire Island Lightship No. 68 [256]	—	NLS	—	U.S. Navy	—	O	X	—	—
Fort Adams [255]	Rhode Island	WUU	125	U.S. Army	1,200	O	Mean time of the meridian 75° west of Greenwich: 6 a.m. to 10 p.m.	—	—
Fort Andrews [255]	Massachusetts	WUA	—	U.S. Army	—	O	—	—	—
Fort Barrancas [255]	Florida	WZD	125	U.S. Army	1,200	O	X	—	—
Fort Caswell [255]	North Carolina	WUT	—	U.S. Army	825	O	Mean time of the meridian 75° west of Greenwich: 6 a.m. to 10 p.m.	—	—
Fort Constitution [255]	New Hampshire	WZE	—	U.S. Army	825	O	X	—	—
Fort Crockett [255]	Texas	WUX	30	U.S. Army	1,200	O	X	—	—
Fort Dade [255]	Florida	WZK	—	U.S. Army	825	O	X	—	—
Fort Hancock, New Jersey [255]	—	WUB	—	U.S. Army	—	O	—	—	—
Fort H. G. Wright [255]	New York	WUC	—	U.S. Army	—	O	—	—	—
Fort Howard [255]	Maryland	WZB	50	U.S. Army	1,200	O	X	—	—
Fort Leavenworth WUD [255]	Kansas 94° 55′ 31″ W. 39° 21′ 00″ N.	WUD	—	U.S. Army	1,800	O	—	—	—
Fort Leavenworth WUV [169]	Kansas	WUV	—	U.S. Army	—	O	—	—	—
Fort Levett [255]	Maine	WUE	—	U.S. Army	—	O	—	—	—
Fort Monroe WUF [255]	Virginia	WUF	—	U.S. Army	—	O	—	—	—
Fort Monroe WUG [170]	Virginia	WUG	—	U.S. Army	—	O	—	—	—

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Fort Morgan, Alabama WFM	88° 01′ 23″ W. 30° 13′ 42″ N.	WFM	200	Marconi Co. ..	300, 435, **600**	P G [211]	— [209]	0.30	3.00
Fort Morgan Alabama WUR [255]	—	WUR	30	U.S. Army ..	1,200	O	X	—	—
Fort Moultrie [255]	South Carolina	WZF	—	U.S. Army ..	825	O	X	—	—
Fort Riley, Kansas[255] ..	96° 47′ 01″ W. 39° 04′ 35″ N.	WUI	—	U.S. Army ..	1,200	O	—	—	—
Fort Rosecrans [255] ..	California	WUS	30	U.S. Army ..	1,200	O	X	—	—
Fort Sam Houston[255] ..	Texas 98° 27′ 31″ W. 29° 27′ 04″ N.	WUJ	—	U.S. Army ..	650	O	—	—	—
Fort San Jacinto [255] ..	Texas	WUY	30	U.S. Army ..	1,200	O	X	—	—
Fort Screven[255]	Georgia	WZA	30	U.S. Army ..	1,200	O	X	—	—
Fort Stevens[265]	Oregon	WUK	—	U.S. Army ..	—	O	—	—	—
Fort Terry, New York[255]	—	WUW	—	U.S. Army ..	1,200	O ..	—	—	—
Fort Totten[255]	New York	WUL	—	U.S. Army ..	—	O	—	—	—
Fort Whitman [265] ..	Washington	WZC	100	U.S. Army ..	1,200	O	X	—	—
Fort Winfield Scott[255] ..	California	WUO	—	U.S. Army ..	—	O	—	—	—
Fort Wood[255]	New York	WUM	—	U.S. Army ..	—	O	—	—	—
Fort Worden[255]	Washington	WUN	—	U.S. Army ..	—	P G	—	0.30	3.00
Frankfort, Michigan ..	86° 14′ 17″ W. 44° 37′ 46″ N.	WFK	150	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 8 a.m. to midday, 1 p.m. to 7 p.m.	0.15	1.50
Frying Pan Shoals Lightship [256]	North Carolina, off Cape Fear 77° 48′ 20″ W. 33° 33′ 30″ N.	NLC	60	U.S. Navy ..	—	O [160 165 172] ..	Mean time of the meridian 75° west of Greenwich: 6 a.m. to 10 p.m.[166]	— [253]	— [253]
Galveston	Texas 94° 46′ 52″ W. 29° 18′ 54″ N.	WGV	200	Marconi Co. ..	300, 500 [21] **600**	P G & Special [21]	Mean time of the meridian 90° west of Greenwich: 7 a.m. to midday, 1 p.m. to 2 a.m.	0.30	3.00

							of Greenwich: 7 a.m. to 11 a.m., 8 p.m. to 11 p.m.		
Grand Marais	Minnesota 90° 20′ 00″ W. 47° 45′ 00″ N.	WGM	120	Marconi Co. ..	300, 600	P G [134]	—	0.15	1.50
Great Lakes [256] [282] ..	Illinois 87° 50′ 00″ W. 42° 18′ 30″ N.	NAJ	800	U.S. Navy ..	300, 600, 1,000	O	N	—	—
Heald Bank Lightship [256]	Off Galveston (Texas) 94° 13′ 00″ W. 29° 06′ 00″ N.	NLP	60	U.S. Navy ..	300, 600	O	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 10 p.m.	—	—
Hillcrest, Daly City ..	California 122° 30′ 00″ W. 37° 48′ 00″ N.	KPH	200	Marconi Co. ..	300, 600	P G	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Hoboken, New Jersey ..	74° 02′ 00″ W. 40° 43′ 00″ N.	WBU	400	Marconi Co. ..	2,240	— [152]	X	—	—
Hollister, California ..	121° 24′ 00″ W. 36° 55′ 43″ N.	KGH	200	Palmer B. Hewlett	300, 600, 1,650	— [261]	X	—	—
Independence, Kansas ..	95° 44′ 00″ W. 37° 14′ 00″ N.	WQL	150	Kansas Gas & Electric Co.	1,700	P [294]	X	—	—
Indianhead, Maryland [256]	77° 10′ 55″ W. 38° 38′ 00″ N.	NBG	—	U.S. Navy ..	300, 600, 750	O	— [284]	—	—
Inglewood, California ..	118° 19′ 48″ W. 33° 58′ 04″ N.	KFZ	500	Federal Telegraph Co.	300, 600, 3,300, 4,000	— [151]	Mean time of the meridian 120° west of Greenwich: 9 a.m. to 6 p.m.	—	—
Jacksonville, Florida ..	Mouth of St. John's River 81° 38′ 56″ W. 30° 19′ 25″ N.	WJX	200	Marconi Co. ..	300, 450, 600	P G	Mean time of the meridian 90° west of Greenwich: 6 a.m. to 8 a.m., 10 a.m. to 1 p.m., 4 p.m. to 7 p.m.	0.30	3.00
Jupiter [256]	East coast of Florida 80° 04′ 55″ W. 26° 56′ 52″ N.	NAQ	200	U.S. Navy ..	—	O [169]	N	— [253]	— [253]
Key West, Florida [254] ..	81° 48′ 26″ W. 24° 33′ 28″ N.	NAR	400	U.S. Navy ..	600	P G [160] [162] ..	N	0.30	3.00
Lents	Oregon 122° 35′ 00″ W. 45° 23′ 00″ N.	KFU	—	Federal Telegraph Co.	—	—	—	—	—
Lewistown	Montana	KLP	150	Montana Power Co.	300, 600, 1,600	P	X	—	—
Los Angeles California ..	118° 15′ 00″ W. 34° 04′ 00″ N.	KLS	1,000	Federal Telegraph Co.	300, 600, 1,800, 2,800, 3,250	P G [292] ..	Mean time of the meridian 120° west of Greenwich: 4 a.m. to 10 p.m.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*								Francs.	Francs.
Ludington, Michigan ..	Meridian of Greenwich 86° 26′ 19″ W. 43° 56′ 47″ N.	WLD	125	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 11 a.m., midday to 6 p.m., 8 p.m. to 1 a.m., 2 a.m. to 7 a.m [171]	0.15	1.50
Mackinac Island	Michigan 84° 37′ 00″ W. 45° 50′ 00″ N.	WHQ	150	Marconi Co. ..	300, 500, **600**	P G	—[223]	0.15	1.50
Manistique	Michigan 86° 15′ 36″ W. 45° 57′ 36″ N.	WMX	125	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 7 p.m. to 9 p.m.	0.15	1.50
Manitowoc	Wisconsin 87° 39′ 17″ W. 44° 05′ 18″ N.	WMW	125	Marconi Co. ..	300, 500, **600**	P G [212] ..	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 11.30 a.m., 2.30 p.m. to 6 p.m., 7.30 p.m. to 8.30 p.m.	0.15	1.50
Marshfield, Oregon ..	124° 12′ 50″ W. 43° 22′ 26″ N.	KPX	150	Marconi Co. ..	300, **600**	P G	—[226]	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Miami, Florida	South-east Coast of Florida 80° 07′ 15″ W. 25° 48′ 21″ N.	WST	300	Marconi Co. ..	300, 450, **600**	P G [225] ..	N	0.30	3.00
Milwaukee	Wisconsin 87° 55′ 25″ W. 43° 02′ 50″ N.	WME	150	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 8 a.m. to midday, 1 p.m. to 5 a.m.	0.15	1.50
Mobile, Alabama ..	88° 02′ 27″ W. 30° 41′ 34″ N.	WMB	200	Marconi Co. ..	300, 535, **600**	P G [222] ..	—[224]	0.30	3.00
	[illegible]	[illegible]	[illegible]	Runyan J. Hyatt	500	—[177]	X	—	—

Nantucket Shoals Light-	To the east of New- end of shoals 69° 36′ 33″ W. 40° 37′ 05″ N.	NLA	60	U.S. Navy			meridian 75° west of Greenwich: 4 a.m. to midnight.[166]		
New London, Connecticut NRZ [271]	72° 05′ 40″ W. 41° 22′ 40″ N.	NRZ	100	U.S. Coast Guard Service	300, **600**	O [251]	X	—	—
New London, Connecticut WLC	72° 05′ 25″ W. 41° 19′ 00″ N.	WLC	100	T. A. Scott Co. Incorp.	300, 510, **600**, 1,610, 1,700, 1,800, 1,900, 2,000	P G	Mean time of the meridian 75° west of Greenwich: 8 p.m. to 4 a.m.	0.15 [227] 0.30 [158] 0.60 [159]	1.50 [227] 3.00 [158] 6.00 [159]
New Orleans NAT [256] ..	Louisiana, Algiers, 90° 02′ 18″ W. 29° 56′ 50″ N.	NAT	100	U.S. Navy ..	—	O [161 263 272] ..	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 10 p.m.[166]	— [161 253]	— [161 253]
New Orleans WHK ..	Louisiana 90° 07′ 00″ W. 29° 59′ 00″ N.	WHK	200	Marconi Co. ..	300, **600**	P G	— [233]	0.30	3.00
New Orleans WNU ..	Louisiana 90° 06′ 20″ W. 30° 00′ 20″ N.	WNU	400	Tropical Radio Telegraph Co.	300, **600**, 2,200	P G [228] ..	N	0.60	6.00
Newport, Rhode Island NAF [256]	71° 19′ 44″ W. 41° 29′ 17″ N.	NAF	200	U.S. Navy ..	—	O [160]	N	— [253]	— [253]
Newport, Rhode Island, WCI	71° 18′ 58″ W. 41° 29′ 15″ N.	WCI	100	National Electric Signalling Co.	300, 550, **600**	P G	Mean time of the meridian 75° west of Greenwich: 7 p.m. to 6 a.m.	0.15 [236] 0.30 [237] 0.60 [159]	1.50 [236] 3.00 [237] 6.00 [157]
New Prague	Minnesota 93° 31′ 12″ W. 44° 32′ 39″ N.	WPU	300	New Prague Flouring Mill Co. (International Milling Co.)	500	— [276]	X	—	—
New York NAH [256] ..	Brooklyn 73° 58′ 51″ W. 40° 41′ 58″ N.	NAH	150	U.S. Navy ..	—	O [160 189] ..	N	— [253]	— [253]
New York WHB ..	74° 00′ 50″ W. 40° 42′ 02″ N.	WHB	300	New York Herald Co.	300, **600**, 1,610	P G [174]	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
New York WHI [187] ..	73° 59′ 31″ W. 40° 43′ 50″ N.	WHI	—	Marconi Co. ..	300, **600**	P G	N	— [260] 0.30 [158] 0.60 [159]	— [260] 3.00 [158] 6.00 [159]
New York WNT ..	74° 00′ 00″ W. 40° 42′ 00″ N.	WNT	150	Atlantic Communication Co.	300, **600**, 1,800 [175]	P G	Mean time of the meridian 75° west of Greenwich: 9 a.m. to 5 p.m. Sundays and holidays: —	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Norfolk, Virginia [256] ..	76° 17′ 41″ W. 36° 49′ 39″ N.	NAM	200	U.S. Navy ..	—	O [160]	N	— [253]	— [253]
North Head [256]	Washington, Estuary of Columbia River 124° 04′ 34″ W. 46° 17′ 42″ N.	NPE	400	U.S. Navy ..	600	P G [160 273] ..	N	0.30	3.00

Land Stations—*Continued*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge. Per Word.	Coast Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*	Meridian of Greenwich							Francs.	Francs.
Oakland, California ..	122° 16′ 14″ W. 37° 48′ 41″ N.	KGI	150	Ellery W. Stone ..	300, 500, **600**	P	X	—	—
Passagrille	Florida 82° 44′ 16″ W. 27° 40′ 53″ N.	WRG	50	C. A. Brown ..	300, 435, **600**	P G [118]	X	0.20	2.00
Pensacola, Florida [256] ..	Gulf of Mexico 87° 16′ 13″ W. 30° 20′ 54″ N.	NAS	100	U.S. Navy ..	600	P G [160]	N	0.30 [253]	3.00 [253]
Philadelphia NAI [256] ..	Pennsylvania 75° 10′ 46″ W. 39° 53′ 18″ N.	NAI	150	U.S. Navy ..	—	O [160]	N	— [253]	— [253]
Philadelphia WHE [187] ..	Pennsylvania 75° 09′ 44″ W. 39° 57′ 06″ N.	WHE	100	Marconi Co. ..	300, **600**, 1,550 [176]	P G [22]	Mean time of the meridian 75° west of Greenwich: 9 a.m. to 5.30 p.m.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Phœnix, Arizona ..	112° 05′ 30″ W. 33° 26′ 30″ N.	KHQ	300	Federal Telegraph Co.	3,000, 3,400	— [[illegible]]	Local time: 6 a.m. to 6 p.m.	—	—
Point Arguello [256] ..	California 120° 38′ 48″ W. 34° 34′ 35″ N.	NPK	100	U.S. Navy ..	600	P G [160 274] ..	N	0.30	3.00
Point Isabel	Texas	NAY	—	Navy	—	P G	—	—	—
Port Arthur, Texas ..	93° 55′ 35″ W. 29° 52′ 46″ N.	WRU	200	Marconi Co. ..	300, **600**	P G	Mean time of the meridian 90° west of Greenwich: 6.30 a.m. to midday, 12.30 p.m. to 6 p.m., 6.30 p.m. to 8.30 p.m.	0.30	3.00
Portland, Maine NAB [256]	70° 12′ 03″ W. 43° 33′ 42″ N.	NAB	100	U.S. Navy ..	—	O [160 161] ..	Mean time of the meridian 75° west of Greenwich: 8 a.m. to 10 p.m.[166]	— [161 253]	— [161 253]
Portland, Maine WXV ..	—	WXV	30	National Guard State of Maine	—	O	X	—	—
Portland, Oregon KDP ..	122° 42′ 30″ W. 45° 30′ 45″ N.	KDP	150	Charles L. Austin	200, 300, 425, 550, **600**	— [188] ..	X	—	—
Portland, Oregon KGN ..	122° 41′ 00″ W. 45° 32′ 00″ N.	KGN	150	North Western Electric Co.	300, **600**, 1,700	— [38]	X	—	—
Port Royal, South Caro-	80° 41′ 00″ W.	NAV	—	U.S. Navy ..	—	O	N	—	—
Portsmouth, New Hampshire [258]	43° 04′ 33″ N.					O [160] ..	N	— [253]	— [253]

Providence, Rhode Island									
Puget Sound [256]	Washington 122° 38′ 19″ W. 47° 33′ 47″ N.	NPC	200	U.S. Navy ..	—	O	N	— [253]	— [253]
Rialto, California.. ..	117° 26′ 53″ W. 34° 12′ 08″ N.	KJR	250	Southern California Edison Co.	300, **600**, 1,610	P R [186] ..	X	—	—
River Rouge	Michigan 83° 07′ 15″ W. 42° 15′ 17″ N.	WDR	150	Marconi Co. ..	300, 500, **600**	P G	Mean time of the meridian 90° west of Greenwich: 7 a.m. to 11.30 a.m. 12.30 p.m. to 6 p.m., 7 p.m. to 11 p.m., midnight to 6 a.m. [188]	0.15	1.50
Sagaponack	New York 72° 17′ 02″ W. 40° 54′ 44″ N.	WSK	100	Marconi Co. ..	300, **600**	P G	X	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
St. Augustine, Florida [256]	North-east coast of Florida 81° 17′ 05″ W. 29° 53′ 20″ N.	NAP	100	U.S. Navy ..	600	P G [160].. ..	N	0.30 [253]	3.00 [253]
St. Petersburg, Florida ..	82° 38′ 27″ W. 27° 46′ 28″ N.	WIX	25–50	C. C. Brown ..	300, 395, **600**	— [219]	Mean time of the meridian 90° west of Greenwich: 8 a.m. to 11 a.m., 1 p.m. to 5 p.m., 7.30 p.m. to 8 p.m.	—	—
San Diego, California KSD	117° 09′ 37″ W. 32° 41′ 30″ N.	KSD	500	Federal Telegraph Co.	300, **600**, 1,800, 2,800	P G [232].. ..	Mean time of the meridian 120° west of Greenwich: 4 a.m. to 8 p.m.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
San Diego, California NPL [256]	117° 15′ 00″ W. 32° 42′ 26″ N.	NPL	200	U.S. Navy ..	600, 1,000, 1,800	P G [160 273] ..	N	0.30	3.00
San Francisco KFS ..	California 122° 30′ 06″ W. 37° 49′ 36″ N.	KFS	750	Federal Telegraph Co.	300, **600**, 1,800, 3,000, 3,500	P G [232] ..	Mean time of the meridian 120° west of Greenwich: 7 a.m. to 2 a.m.	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
San Francisco NPG [256] ..	122° 22′ 02″ W. 37° 48′ 30″ N.	NPG	—	U.S. Navy ..	—	O	N	—	—
San Francisco NPH [256] ..	California 122° 15′ 56″ W. 38° 05′ 03″ N.	NPH	200	U.S. Navy ..	—	O [160 163] ..	N	— [253]	— [253]
Savannah	Georgia 81° 06′ 15″ W. 32° 05′ 15″ N.	WSV	200	Marconi Co. ..	300, 450, **600**	P G	Mean time of the meridian 90° west of Greenwich: 6 a.m. to midnight.	0.30	3.00
Sayville [9]	New York Long Island 73° 06′ 12″ W. 40° 14′ 46″ N.	WSL	4,500	Atlantic Communication Co.[47]	3,900, 4,700, 5,200 6,300, 7,800, 9,400	P G [189].. ..	Mean time of the meridian 75° west of Greenwich: 2 a.m. to 2 p.m.	—	—
Scranton, Pennsylvania..	75° 42′ 00″ W. 41° 24′ 00″ N.	WTP	—	Delaware, Lackawanna & Western Railroad Co.	—	— [234]	—	—	—

Land Stations—*Continuea*

Name.	Geographical Position.	Call Signal.	Normal Range in Nautical Miles.	Station Controlled by	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Service.	Hours of Service.	Coast Charge.	
								Per Word.	Minimum Charge.
UNITED STATES OF AMERICA—*contd.*	Meridian of Greenwich.							Francs.	Francs.
Sea Gate	New York 74° 00′ 12″ W. 40° 34′ 23″ N.	WSE	200	Marconi Co. ..	300, **600**	P G	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Seattle KPA	Washington 122° 20′ 00″ W. 47° 36′ 00″ N.	KPA	150	Marconi Co. ..	300, 500, **600** 1,650 2,980	P G [216]	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
Seattle KPE	Washington 122° 20′ 00″ W. 47° 37′ 00″ N.	KPE	100	City of Seattle Harbor Dept.	300, 575, **600**	P G	Mean time of the meridian 120° west of Greenwich: 8 a.m. to midday, 1 p.m. to 5 p.m., except Sundays and holidays.	0.30	3.00
Siasconset..	Massachusetts, Nantucket Island 69° 58′ 19″ W. 41° 15′ 50″ N.	WSC	165	Marconi Co. ..	300, **600**	P G	N	0.30 [158] 0.75 [159]	3.00 [158] 7.50 [159]
South San Francisco ..	California 122° 24′ 20″ W. 37° 44′ 40″ N.	KSS	2,500	Federal Telegraph Co.	300, **600**, 1,800, 5,000, 8,000, 10,000	P G [231] ..	N	0.30 [158] 0.60 [159]	3.00 [158] 6.00 [159]
South Wellfleet [1] ..	Massachusetts Cape Cod 69° 58′ 18″ W. 41° 54′ 51″ N.	WCC	600	Marconi Co. ..	300, **600**, 2,100 [182]	P G	N	0.30 [158] 0.60 [159] 2.10 [210]	3.00 [158] 6.00 [159] 21.00 [210]
Tampa, Florida	82° 25′ 36″ W. 27° 56′ 54″ N.	WPD	200	Marconi Co. ..	300, 510, **600**	P G	Mean time of the meridian 90° west of Greenwich: 6 a.m. to 8 a.m. 10 a.m. to 1 p.m., 4 p.m. to 7 p.m.	0.30	3.00
Tatoosh [256]	Washington, off Cape Flattery 124° 44′ 06″ W. 48° 23′ 30″ N.	NPD	100	U.S. Navy ..	600	P G [160]	N	0.30	3.00
Tuckerton, New Jersey ..	74° 20′ 00″ W. 39° 34′ 45″ N.	WGG	4,000	— [36]	8,600	— [179]	N	—	—

							of Greenwich: 9 a.m. to 11.30 a.m., 7.30 p.m. to 11 p.m.		
Virginia Beach	Virginia, entrance to Chesapeake Bay 75° 58′ 58″ W. 36° 50′ 36″ N.	WSY	200	Marconi Co. ..	300, 550, 600	P G [183]	N	0.30	3.00
Washington NAA [256] ..	Virginia, near Washington, D.C. 77° 04′ 47.20″ W. 38° 52′ 05.20″ N.	NAA	1,000	U.S. Navy ..	—	O [157 160 189] ..	N	— [253]	— [253]
Washington NAL [256 257] ..	District of Columbia 77° 00′ 11″ W. 38° 52′ 21″ N.	NAL	150	U.S. Navy ..	—	O [160]	N	— [253]	— [253]
Washington NZW ..	District of Columbia 77° 00′ 32″ W. 38° 53′ 12″ N.	NZW	500	Supt., U.S. Capitol Building and Grounds	250, 650, 1,000	O	X	—	—
Washington WUP [184] ..	District of Columbia	WUP	—	U.S. Army ..	—	O	—	—	—
Washington WUQ [185]	District of Columbia	WUQ	—	U.S. Bureau of Standards	—	O	—	—	—
Wells, Minnesota.. ..	93° 45′ 00″ W. 43° 45′ 00″ N.	WPT	150	Wells Flour Mill Co.	500	P [296]	X	—	—
Wichita, Kansas	97° 20′ 00″ W. 37° 42′ 00″ N.	WQM	200	Kansas Gas & Electric Co.	1,700	P [295]	X	—	—
Wilmington, Delaware ..	75° 32′ 52″ W. 39° 44′ 16″ N.	WPP	300	E. I. du Pont de Nemours & Co.	300, 425, 600	— [276]	X	—	—
URUGUAY									
Banco Ingles	To the south-east of Montevideo 55° 53′ 30″ W. 35° 06′ 30″ S.	CWC	100	—	450, 600	—	—	—	—
Cerrito	Near Montevideo 56° 10′ 10″ W. 34° 51′ 20″ S.	CWA	1,000	—	600, 1,000, 1,250	P G	N	0.53	5.30
Isla de Lobos	54° 53′ 01″ W. 35° 01′ 39″ S.	CWB	100	—	450, 600	—	—	—	—
ZANZIBAR							Local time of Zanzibar		
Pemba, Zanzibar.. ..	39° 45′ 00″ E. 5° 14′ 00″ S.	VQE	85	—	300, 600	P G [154]	8 a.m. to midday, 2 p.m. to 4 p.m.	0.20	1.60
Zanzibar	39° 11′ 00″ E. 6° 10′ 00″ S.	VPZ	85	—	300, 600	P G [155]	8 a.m. to midday, 2 p.m. to 4 p.m.	0.20	1.60

NOTES

Land Stations

1. Meteorological forecasts are transmitted free of charge by coast stations to vessels at the following hours (Melbourne time) :—Adelaide Radio, 7 p.m. and 8.30 p.m.; Melbourne Radio, 7.30 p.m. and 9 p.m.; Sydney Radio, 8 p.m. and 9.30 p.m.; Hobart Radio, 10 p.m.; Brisbane Radio, 10.30 p.m. and 11 p.m.

2. The station transmits time signals at 10 a.m. and 10 p.m. (standard convention symbols).

3. In the case of radiotelegrams originating at or intended for the place (or places) named against the letter in reference, the charge for transmission between such place and the coast station concerned is included in the coast charge :—

(*a*) Macquarie Island.
(*b*) Port Moresby.
(*c*) Bahia (San Salvador).
(*d*) Rio de Janeiro.
(*e*) Campos or Rio de Janeiro.
(*f*) Fernando de Noronha or Recife, (Pernambuco).
(*g*) Pelotas or Rio Grande do Sul.
(*h*) Santos.
(*i*) Olinda or Recife (Pernambuco).
(*j*) Nassau.
(*k*) Port of Spain (Trinidad) or Scarborough (Tobago).
(*l*) Flinders Island.
(*m*) Florianopolis (Desterro, Santa Catharina).
(*n*) Canton or Shameen
(*o*) Foochow.
(*p*) Shanghai or Woosung (Kiangsu).
(*q*) Port Sudan.
(*r*) Casablanca, Maroc.
(*s*) Mogador.
(*t*) Tanger.
(*u*) Falkland Islands.

4. Mean time of the meridian of Cordoba. 4 hours 16 minutes 48·22 seconds later than Greenwich time.

5. The hours are extended on the dates of arrival and departure of the regular steamers of the Compagnie Belge Maritime du Congo.

6. The station is open for public correspondence in the inland service.

7. The station also communicates by radiotelegraphy with Loango.

8. For correspondence with the Belgian Government steamers on the voyage between Dover and Ostend, no special coast charge. The total wireless charge is fixed at fr. 1.50 per radiotelegram of 10 words or less, with fr. 0.10 additional for each word over ten.

9. For long range communication.

10. The station is limited to correspondence with coast and ship stations of the North Alaska Salmon Company.

11. The long wave-lengths are used for correspondence with Ketchikan.

12. The station also communicates with Ketchikan.

13. Under construction.

14. The long wave-lengths are used for correspondence with Astoria (Oregon, United States).

15. The station also communicates with Astoria, Oregon (United States), and with Juneau and Port Walter, Alaska.

16. The handling of public correspondence has been suspended.

17. The station is limited to correspondence with Nulato and Holy Cross (Alaska).

18. The station also exchanges ordinary telegrams with the peninsular of Yucatan.

19. The station also corresponds with a station at Virginia Beach (Virginia) when the Weather Bureau's wire is out of order.

20. The station also exchanges public and official correspondence with Trinidad.

21. Correspondence with Heald Bank Lightship.

22. The station also exchanges correspondence of private interest with other fixed stations.

23. During the day-time the station is largely occupied with inland communication.

24. Information regarding weather is distributed twice daily from the station at 1 p.m. and 1 a.m. (Indian standard time—see Note 27).

25. Information regarding weather is distributed twice daily from the station at 1.10 p.m. and 1.10 a.m. (Indian standard time—see Note 27).

26. In advance of Greenwich time by 3 hours 51 minutes.

27. Time of British India; 5 hours 30 minutes in advance of Greenwich time.

28. The station also exchanges public and official correspondence with Berbera Radio.

29. The station also exchanges public and official correspondence with Aden Radio.

30. In the case of radiotelegrams neither originating at nor intended for Berbera itself, the coast charge is included in the charge of fr. 0·625 for transmission between Aden and Berbera.

31. Jamaica standard time 5 hours later than Greenwich time.

32. The station also communicates by radiotelegraphy with Miami, Florida.

33. The charges applicable to the transmission of radiotelegrams to places other than Port of Spain, Trinidad, or Scarborough, Tobago will be notified to ship stations by the coast station. *See* Note 3 (*k*).

34. The station also exchanges public and official correspondence with Tobago.

35. Accounts should be rendered to the Marconi Wireless Telegraph Company of Canada, Montreal.

36. The station is temporarily operated by the United States Naval Communication Service, Radio, Virginia.

37. Cape Sable and Sable Island communicate with the land telegraphic system through Camperdown Nova Scotia. Radiotelegrams exchanged between Cape Sable or Sable Island and Camperdown Nova Scotia are subject to a retransmission charge of fr. 0.30 per word, with a minimum of fr. 3.00 per radiotelegram. This charge is additional

to the ordinary radio and land telegraph rates, and should be credited to the Marconi Wireless Telegraph Company of Canada, Montreal.

38. The station is limited to correspondence with Underwood (Washington State).

39. For radiotelegrams sent by or addressed to the commander of a ship and relating to the service of the ship, the coast charge is 25 centimes per word, with a minimum of fr. 2.50 per radiotelegram. The preamble of such radiotelegrams should contain the service instruction S B.

40. For radiotelegrams sent from or addressed to ships engaged in the local service between Victoria, Vancouver and Seattle, the coast charge is fr. 0.15 per word, with a minimum of fr. 1.50 per radiotelegram. The preamble of such radiotelegrams should contain the service instruction F B.

41. Accounts should be rendered to the District Superintendent, B. C. Division, Government Radiotelegraph Service, Victoria, B.C.

42. The station is open only during the season of navigation, approximately April to December.

43. The station communicates only with ships of the Graham and Morton Transportation Company.

44. Pacific standard time; 8 hours later than Greenwich time.

45. Atlantic standard time; 4 hours later than Greenwich time.

46. The station receives weather forecasts from the Canadian Meteorological Service at 10 p.m. These advices will be transmitted free to any ship station on request. In addition, the station transmits, without coast charge, radiotelegrams of the following kinds:—

1. Any message concerning the navigation of a vessel sent by the captain of the vessel and intended for any department of the Government, any officer of the Government, or the officer in charge of the coast station

2. Messages exchanged between the captain of any vessel and any person whatsoever concerning the state of the weather, the condition of the tide or ice, or reports on aids to navigation.

47. The station is temporarily operated by the United States Naval Communication Service, Radio, Virginia. Accounts should be rendered to the Atlantic Communication Company, 47, West Street, New York.

48. The station is limited to correspondence with Mount Vernon, Ohio.

49. Five hours later than Greenwich time.

50. The station belongs to the Marconi International Marine Communication Company, London, and the Eastern Extension Australasia and China Telegraph Company, London; it is operated and controlled by the latter company.

51. The station exchanges public correspondence with Curaçao.

52. The station also exchanges public correspondence with Aruba and Bonaire.

53. Radiotelegraphic communication with ships at sea only in case of distress.

54. Radiotelegrams are accepted only at the sender's risk.

55. For the present no coast charge is made.

56. Central European time: one hour in advance of Greenwich time.

57. The station accepts only messages received from Mogadiscio I S G.

58. The station also communicates by radiotelegraphy with the other stations in the Fiji Islands. The charge for the transmission of radiotelegrams between two coast stations in the Fiji Islands is fr. 0.30 per word. In addition, the station exchanges meteorological telegrams with ships in stormy weather.

59. Eastern European time: two hours in advance of Greenwich time.

60. From Monday to Friday, 9 a.m. to 1 p.m., 2 p.m. to 3 p.m., or until the completion of the work, and at 7 p.m. until the completion of the work; Saturday, 9 a.m. to 1 p.m., or until the completion of the work; Sunday and public holidays, 8 a.m. to 8.30 a.m., and at 7 p.m. until the completion of the work.

61. The coast charge is reduced to fr. 0.15 per word for correspondence with ships engaged in a regular service between France on the one hand and Corsica, Algeria and Tunis on the other

62. The coast charge is reduced to fr. 0.15 per word for correspondence with ships whose home ports are on the coast of the English Channel and the Straits of Dover, and which are engaged in a regular service between France and England.

63. Experimental station, also open for distress calls.

64. The station belongs to the State Railway Administration, and is used in connection with the business of the ships employed on the service between Dieppe and Newhaven.

65. The station also communicates by radiotelegraphy with Boma and Brazzaville.

66. Continuous service during the voyages of the regular steamers.

67. Meteorological telegrams are transmitted at 9.30 a.m.

68. The wave-length of 1,600 metres is used for communication with Rufisque. The station also listens on the wave-length of 300 metres.

69. The wave-length of 900 metres is used in particular for communication with Rufisque. The station also listens on the wave-length of 300 metres.

70. The station connects with the inland telegraph system through the Rufisque station. The charge applicable to transmission in either direction between Port-Etienne and Rufisque is fr. 0.30 per word.

71. The wave-length of 1,600 metres is used for transmission and for all communications with Port-Etienne and Conakry. The station also listens on the wave-length of 300 metres.

72. The station exchanges radiotelegrams with Port-Etienne and Conakry and only communicates with ships as substitute for Dakar.

73. The working of the station is temporarily suspended.

74. For telegrams of which the only wireless transmission takes place between the lightship and the shore, a fixed charge of fr. 1.00 per telegram only is collected, in addition to the ordinary charges for transmission over the land lines.

75. Public correspondence restricted to urgent messages relating to navigation.

76. The station communicates only with the ships of the Norddeutcher Lloyd Company and only as regards the reception of radiotelegrams.

77. Storm-warnings directed to the German Baltic coast are transmitted three times on the wave-length of 450 metres, as soon as the station has the information. They are repeated once at 1 p.m. and 11 p.m. (Central European time—one hour in advance of Greenwich time). For other warnings of storms, see Cuxhaven and Norddeich.

78. When the working of the Norddeich station is interrupted, storm-warnings are transmitted three times, as required, on the wavelength of 1,650 metres, as soon as the station has the information. They are repeated once at 1 p.m. and 11 p.m. (Central European time—one hour in advance of Greenwich time). Storm-warnings directed only to the German Baltic coast are sent out by the Bülk station.

79. The station is prepared to receive calls chiefly during the first 15 minutes of each of its hours of service.

80. The station communicates only with fishing and coasting vessels.

81. The station transmits on the wave-length of 1,650 metres:

a. Time-signals: noon and midnight (Greenwich mean time).

Method of transmission:

From 11.53 to 11.55, preparatory signals v v v v . . . . .
at 11.57′ 47″ —.—.— (call)
—.— .— . . .— (call signal of Norddeich)
—— ——. ——. . (Greenwich mean time)
at 11.58′ 38″ —.—.— (call)

From 11.58′ 46″ to 11.58′ 50″		
,, 11.58′ 56″ ,, 11.59′ 00″		
,, 11.59′ 06″ ,, 11.59′ 10″	}	a dash lasting $\frac{1}{3}$ second at the end of each second precisely.
,, 11.59′ 36″ ,, 11.59′ 40″		
,, 11.59′ 46″ ,, 11.59′ 50″		
,, 11.59′ 56″ ,, 12.00′ 00″		

at 12.00′ 06″ .—.—. (end)

b. Notices of importance intended for navigators (displacement of lights, etc.) transmitted as required, and repeated three times, as soon as received. These messages are repeated three times immediately after the time-signals, at noon and midnight (Greenwich mean time).

c. Meteorological telegrams, daily at 1 p.m. (Central European time—one hour in advance of Greenwich time).

d. Storm-warnings intended for the German North Sea coast, transmitted as required, and repeated three times, as soon as received. These warnings are repeated once at 1 p.m. or 11 p.m. (Central European time—one hour in advance of Greenwich time). When the working of the Norddeich station is interrupted, the storm-warnings are sent out in the same manner by the Cuxhaven station. Storm-warnings intended only for the German Baltic coast are sent out from Bülk.

82. Official correspondence with Trälleborg and with the ferry-boats of the Sassnitz-Trälleborg line, concerning the railway traffic.

83. Public correspondence with the ferry-boats of the Sassnitz-Trälleborg line.

84. The station is prepared to receive calls chiefly during the first fifteen minutes of the second half of each of its hours of service.

85. This station also exchanges public correspondence with Juneau and Sitka.

86. This station also exchanges public correspondence with Kawaihae, Lahaina and Lihue (Hawaiian Islands), Tutuila and Apia (Samoa Islands).

87. This station also exchanges public correspondence with Koko Head KIE (Hawaiian Islands).

88. At the request of ships, and on payment of the charges, transmission of meteorological reports (not more than twenty words), giving the following information:

a. A general summary of the atmospheric conditions of the morning of the day of transmission of the report;

b. A forecast of the weather—strength and direction of the wind—applicable to the German North Sea coast for the day (midnight to midnight) following the transmission of the forecast;

c. A storm-warning, if required.

Charge per word: fr. 0.18, without minimum.

89. At the request of ships, and on payment of the charges, transmission of meteorological reports (not more than twenty words), giving the following information:

a. A general summary of the atmospheric conditions of the morning of the day of transmission of the report;

b. A forecast of the weather—strength and direction of the wind—applicable to the west part of the German Baltic coast for the day (midnight to midnight) following the transmission of the forecast;

c. A storm-warning, if required.

Charge per word: fr. 0.18, without minimum.

90. At the request of ships, and on payment of the charges, transmission of meteorological reports (not more than twenty words), giving the following information:

a. A general summary of the atmospheric conditions of the morning of the day of transmission of the report;

b. A forecast of the weather—strength and direction of the wind—applicable to the east part of the German Baltic coast for the day (midnight to midnight) following the transmission of the forecast.

c. A storm-warning, if required.

Charge per word: fr. 0.18, without minimum.

91. Special correspondence, including official and ordinary telegrams exchanged with Rathlin Island.

92. For radiotelegrams exchanged with all ships except those making regular voyages not exceeding 1,000 miles to or from a port in the United Kingdom. In the case of radiotelegrams originating in or destined for the United Kingdom, the charge is fr. 0.67 per word, including the coast charge and the charge for transmission over the telegraph lines of the United Kingdom.

93. For radiotelegrams exchanged with ships making regular voyages of more than 200 miles but not more than 1,000 miles to or from a port in the United Kingdom. In the case of radiotelegrams originating in or destined for the United Kingdom the charge is fr. 0.37 per word, with a minimum of fr. 2.22 per radiotelegram, including the coast charge and the charge for transmission over the telegraph lines of the United Kingdom.

94. For radiotelegrams exchanged with ships making regular voyages of 200 miles or less to or from a port in the United Kingdom. In the case of radiotelegrams originating in or destined for the United Kingdom the charge is fr. 0.20 per word, with a minimum of fr. 2.00 per radiotelegram, including the coast charge and the charge for transmission over the telegraph lines of the United Kingdom.

95. A fixed charge of fr. 1.00 per radiotelegram is made, in addition to the ordinary telegraph charges.

96. The station also communicates with Grand Marais (United States).

97. Special correspondence, including official and ordinary telegrams exchanged with Tobermory.

98. Special correspondence with the Dieppe coast station.

99. The wave length of 600 metres is used solely for communication with Scheveningen-Port. Such communication takes place only in case of urgent need.

100. Special correspondence, including official and ordinary telegrams exchanged with Ballycastle, Antrim.

101. For correspondence exchanged with the steam ferries *Hermosa* and *Cabrillo*. Address and signature free of charge.

102. Special correspondence, including official and ordinary telegrams exchanged with Lochboisdale.

103. Correspondence restricted to messages exchanged with the steamers of the South Eastern and Chatham Railway Company.

104. Correspondence restricted to the transmission of radiotelegrams to ships at sea when they are out of range of any other British station.

105. The station is intended for: (*a*) the transmission to the Scheveningen-Port coast station of telegrams received by means of flag signals from ships passing within sight, or the retransmission by means of these signals, to such ships, of telegrams sent to it through the Scheveningen-Port coast station; (*b*) meteorological services.

106. Telegrams originating on or intended for ships and forwarded through Scheveningen-Port are subject to the coast charge of Scheveningen-Port, the charge for transmission over the inland telegraph lines, and a fixed charge of fr. 1.00 per telegram.

107. The station transmits on a wave length of 1,800 metres two messages, one at 11.15 a.m., the other at 11.15 p.m. (Greenwich time), which are made up as follows :—

(*a*) Daily, except on Sundays and holidays, a meteorological telegram preceded by the letters K.N.M.I.

(For further particulars see International Time and Weather Signals—Holland.)

(*b*) The storm signal, when there is one, in Dutch and English.

As the station does not send out the meteorological telegram on Sundays and holidays, the storm signal, when there is one, is on those days preceded by the letters K.N.M.I.

(*c*) Advice to navigators (alterations of lighthouses, lightships, and lightbuoys, the presence of derelicts, and the disappearance or displacement of lightships, lightbuoys, or important buoys) sent out in Dutch as well as English; the advice in Dutch will be preceded by the letters N.B.A.Z.

If there is no advice to navigators, the message will consist only of the meteorological telegram preceded by the letters K.N.M.I., completed where necessary by the storm signal.

If there is no storm signal, but only an advice to navigators, the latter will be preceded by the letters N.B.A.Z. On Sundays and holidays, if there is no signal of either kind, no message will be sent out.

The messages will be transmitted three times in succession. The first time they will be transmitted quickly, and the second and third times slowly.

On request, the messages or a part of them will be transmitted to ships by means of the normal wave length at other times, in return for a charge which may not exceed that for a radiotelegram of 20 words, and which will be debited to the ships.

108. The charge applicable to the transmission of radiotelegrams between the stations of Italian Somaliland is fixed at fr. 2.52 per radiotelegram of ten words or less, with fr. 0.25.20 additional for each word over ten.

109. Exclusively for the service of the steam ferry-boats of the Strait of Messina.

110. The station also transmits messages to the coast station Massaua. Charge per word: fr. 0.60 for private telegrams; fr. 0.30 for press telegrams.

111. The station transmits each day a time signal for the use of shipping in South African waters. This signal is actuated from the Royal Observatory at the Cape and preceded by the usual warning signal from Capetown. The time signal proper consists of twelve dashes divided into five groups, the commencement of the separate dashes corresponding exactly with the following Greenwich mean times:

GROUP I.	GROUP II.	GROUP III.	GROUP IV.	GROUP V.
8.59′ 30″	8.59′ 38″	8.59′ 44″	8.59′ 48″	8.59′ 54″
8.59′ 32″	8.59′ 40″		8.59′ 50″	8.59′ 56″
8.59′ 34″				8.59′ 58″
				9.00′ 00″

112. The station is limited to correspondence of private interest with the stations of the Ajax Gold Minnig Company, at Victor (Colorado), and H. C. Colburn, at Colorado Springs.

113. The station transmits on the wave length of 600 metres each night, except Sunday, the mean time of Central Japan (time of the meridian 135° E.).

Form of transmission:

From	8.59′ 00″	to	8.59′ 55″	— — — — — — — — — — — —, etc.
,,	9.00′ 00″	,,	9.00′ 01″	—
,,	9.00′ 30″	,,	9.00′ 55″	—.—.—.—.—.—.—, etc.
,,	9.01′ 00″	,,	9.01′ 01″	—
,,	9.01′ 30″	,,	9.01′ 55″	—..—..—..—..—.., etc.
,,	9.02′ 00″	,,	9.02′ 01″	—
,,	9.02′ 30″	,,	9.02′ 55″	— ...—...—...—..., etc.
,,	9.03′ 00″	,,	9.03′ 01″	—
,,	9.03′ 30″	,,	9.03′ 55″	—....—....—....—, etc.
,,	9.04′ 00″	,,	9.04′ 01″	—

114. This charge includes the charge applicable to the transmission over the lines of the Japanese telegraph service of radiotelegrams originating in or intended for the Empire of Japan and Southern Manchuria; but for urgent radiotelegrams there is an additional charge of fr. 0.25 per word.

115. The station also communicates by radiotelegraphy with Dzaoudzi. In case of interruption of the inland telegraph lines, the Diégo-Suarez and Majunga stations exchange by radiotelegraphy the inland and international correspondence.

116. The station also communicates by radiotelegraphy with Majunga.

117. Rate applicable to radiotelegrams to or from vessels trading to ports outside Australasia.

118. The station also exchanges ordinary telegrams originating in or intended for Lower California.

119. The station also exchanges ordinary telegrams originating in or intended for the peninsula of Yucatan.

120. The station transmits the time of the meridian of Tacubaya (see Note 121) daily at noon in the following manner:

From 11.55 a.m. to noon; repeated transmission of the inquiry signal "CQ"; then repeated transmission of the signal "XH" (time of Tacubaya);

At noon: transmission of the word "noon," always followed by a free announcement of the state of the weather.

On request, this announcement will also be transmitted to ships at other times, in return for a charge which must not exceed that for a radiotelegram of twenty words and which will be debited to the ships.

During the transmission of the time-signals and of the meteorological announcement at noon, all other transmission will be stopped, except distress calls. Special warnings necessitated by sudden changes in the state of the atmosphere, by accidents at sea, and by the derangement or displacement of signs intended as aids to navigation (buoys, sea-marks, etc.), will also be transmitted free.

121. Mean time of the meridian of Tacubaya : six hours 36 minutes 46.67 seconds later than Greenwich time.

122. Mean time of New Zealand : in advance of Greenwich time by 11 hours 30 minutes.

123. Meteorological radiotelegrams are sent free of charge and as opportunity offers.

124. Greenwich time : October—March, 8 a.m. to 5 p.m. ; holidays, 8 a.m. to 1 p.m. April—September, 8 a.m. to 2 p.m., 3 p.m. to 7 p.m. ; holidays, 8 a.m. to 1 p.m.

125. The station is open only during the season of navigation, approximately from July to October.

126. The night service is performed alternately by the Flekkerö and Tjömö stations. Flekkerö is open during the nights of Tuesday, Thursday, and Saturday. Tjömö is open during the nights of Monday, Wednesday, and Sunday. The service between 8 a.m. Sunday and 8 a.m. Monday is performed alternately by the two stations.

127. During the months from May to September.

128. During the months from October to April.

129. From the 15th of June to the 30th of September.

130. From the 1st of October to the 14th of June.

131. Röst and Sörvaagen intercommunicate by means of wireless telegraphy.

132. The station also exchanges radiotelegrams with the other coast stations situated in the Azores, within its radius of operation.

133. Public correspondence limited to the ships *Dacia CVD, Imparatul Traian, Principesa Maria, Regele Carol I* and *Romania.*

134. The station also communicates with Duluth (Minnesota).

135. The station communicates only with Nicolaiewsk RNL.

136. The station also communicates by radiotelegraphy with Kerbinskaïa.

137. The station is reserved for the Service of the Gulf of Riga.

138. The station is open only during the season of navigation.

139. The coast charge is reduced to fr. 0.13 per word for correspondence with Russian ship stations.

140. For radiotelegrams exchanged between the stations Rade de Taganrog and Taganrog, there is an additional charge of fr. 0.40 per radiotelegram, plus fr. 0.025 per word.

141. The station transmits each day, at 1 p.m., a report in plain language containing information concerning the meteorological conditions prevailing on the whole of the coast of the Union of South Africa.

142. With the wave length of 1,800 metres.

143. The station transmits only correspondence of the Compañia Trasatlantica.

144. The station exchanges radiotelegrams only with the steam ferries *Cabrillo* and *Hermosa.* The station also communicates with the coast station, East San Pedro (California).

145. Opened provisionally.

146. The station also communicates by radiotelegraphy with Duala. For correspondence with the Cameroons the coast charge is reduced to fr. 0.35 per word, without minimum.

147. In the case of radiotelegrams addressed to the island of Fernando Po, the charge for delivery to destination is included in the coast charge. Moreover, there is no minimum charge for this class of message.

148. The station only exchanges official correspondence with other fixed stations.

149. Official correspondence with Sassnitz and with the ferry-boats of the Trälleborg-Sassnitz line, concerning the railway traffic.

150. The station only corresponds with the radiotelegraph stations situated in the Azores.

151. The station communicates only with San Francisco KFS, San Diego KSD (California) and Phœnix (Arizona).

152. The station is limited to correspondence with Scranton (Pennsylvania), Binghamton, Buffalo (New York State), and with trains of the Delaware, Lackawanna and Western Railway Company. It is used in connection with that company's railroad business.

153. Acts as a retransmitting station for Port Nelson, Manitoba.

154. The station also exchanges public and official correspondence with Zanzibar.

155. The station also exchanges public and official correspondence with Pemba, Zanzibar.

156. Official correspondence with the Danish ferry-boats of the Gjedser-Warnemünde line, concerning the railway traffic.

157. The station sends time-signals for five minutes on wave length of 2,500 metres commencing at 11.55 a.m. and 9.55 p.m. every day, Sundays and holidays included. Final signals at noon and 10 p.m. (time of the meridian 75° west of Greenwich). Every tick of the standard clock of the Naval Observatory, Washington, is transmitted as a dot, omitting the 29th second of each minute, the last five seconds of each of the first four minutes, and finally the last ten seconds of the last minute. The noon and 10 p.m. signal is a dash.

158. For radiotelegrams exchanged with ships in North and South American service.

159. For radiotelegrams exchanged with ships in transoceanic service.

160. Each naval coast station situated within the continental limits of the United States of America and of Alaska, as soon as it is advised of any danger to navigation (the presence of derelicts, displacement of lightships, etc., etc.), will immediately transmit the information on wave-lengths of 600 and 1,000 metres. Such information will be repeated at 8 a.m., noon, 4 p.m., and 8 p.m. (local standard time). Naval coast stations of the Atlantic receiving information of this kind will forward it by radiotelegraphy to Washington NAA Station, and it will be retransmitted by that station daily at 10 p.m. on the wavelength of 2,500 metres. All radiotelegraph stations will broadcast these messages in their turn on wave-lengths of 600 and 1,000 metres at 8 a.m., noon, 4 p.m., and 8 p.m. The foregoing procedure will also obtain on the

Pacific Coast, with the difference that the reports of coast stations will be transmitted to San Francisco NPH, and will be re-transmitted by that station (for the present) to all other coast stations of the Pacific.

161. The station handles public correspondence in emergencies, when the coast rate will be furnished on request.

162. The station sends time-signals daily at noon (time of the meridian 75° west of Greenwich), Sundays and holidays included, on the wave length of 1,500 metres. The manner in which these time signals are transmitted is the same as that indicated in Note 157. Time furnished by the Naval Observatory, Washington, D.C.

163. The station sends time signals daily at 11.55 a.m. and 9.55 p.m. on the wave length of 1,600 metres, Sundays and holidays included. The final signal is sent at noon and 10 p.m. respectively (time of the meridian 120° west of Greenwich). The manner in which these time signals are transmitted is the same as that indicated in Note 157. The time is furnished by the Observatory at Navy Yard, Mare Island, California.

164. The station communicates with the coast through Beaufort (North Carolina).

165. The station furnishes free information of interest to ships on request.

166. The operator is generally at the receiver at the beginning of each hour.

167. The station also communicates with Cape San Antonio (Cuba) and New Orleans WNU.

168. The station sends time-signals daily at noon (time of the meridian 120° west of Greenwich), Sundays and holidays excluded, on the wave length of 1,600 metres. The manner in which these time signals are transmitted is the same as that indicated in Note 157. Time furnished by the Observatory at Navy Yard, Mare Island, California.

169. Army Signal School.

170. Coast Artillery School.

171. When the lake is open to navigation.

172. The station communicates with the coast through Charleston (South Carolina) and Beaufort (North Carolina).

173. The station communicates with the coast through Newport (Rhode Island) NAF.

174. The station transmits daily news without charge, using the wave length of 1,610 metres.

175. The wave length of 1,800 metres is used for special correspondence.

176. The wave length of 1,650 metres is used for special correspondence with New York WHI.

177. The station is limited to correspondence with Canton (Ohio).

178. The station also communicates with St. Petersburg (Florida).

179. The station communicates with Eilvese (Germany).

180. The station communicates with Nauen (Germany).

181. The station also communicates with Juneau (Alaska).

182. The wave length of 2,100 metres is employed for long-range correspondence.

183. The station transmits weather reports daily at 8 a.m. (time of the meridian 75° west of Greenwich).

184. Signal Corps Laboratory (experimental).

185. Bureau of Standards (experimental).

186. The station is limited to correspondence with stations of the Southern California Edison Company.

187. Wanamaker.

188. The station is limited to communication with vessels entering and leaving the port of Portland, or bound to or from Columbia River points.

189. If for any reason the working of the Washington NAA station is suspended, the time signals will be transmitted daily (Sundays and holidays excepted) at noon by the station New York NAH.

190. The long wave length is used for inland communication.

191. The station also communicates with other coast stations in China.

192. Interior station.

193. Time of the east coast of China, eight hours in advance of Greenwich time.

194. Correspondence restricted to the exchange of radiotelegrams with the other lighthouses in Chosen, with the ship *Kosai Maru* belonging to the Chosen Government and with Japanese warships.

195. A service giving warning of the passage of cyclones has been organised, as an experiment, on the east, north-west, and west coasts of Madagascar.

The warning telegram, originating at the Observatory at Antananarivo, will be sent out at the even hours (except between midnight and 6 a.m.) during the probable continuance of the cyclone in the zone within range of the stations. The warning will be sent out alternately by the Dzaoudzi and Majunga stations in the case of a cyclone affecting the region to the north-west of Madagascar or the Mozambique Channel, and alternately by the Dzaoudzi and Diégo-Suarez stations in the case of a cyclone affecting the regions to the north-east and east of Madagascar.

This telegram will be preceded and followed by the warning signal — — — — . . — — — — repeated at short intervals. If the warning signal only is sent out it will indicate, in the absence of precise information, that there is reason to expect the passage of a cyclone.

During the whole of this service the Dzaoudzi, Majunga, and Diégo-Suarez stations will remain on the watch, outside the regular hours of working, during the first quarter of each hour, except between 12.15 p.m. and 6 a.m.

196. This station communicates only with Fairbanks (Alaska).

197. This station also exchanges public correspondence with Jualin, Ketchikan and Port Walter (Alaska).

198. This station also exchanges public correspondence with Port Walter (Alaska).

199. Rate applicable to radiotelegrams to or from vessels trading exclusively (*a*) between New Zealand and Australia, and (*b*) on the New Zealand coast.

200. For press radiotelegrams the coast station rate is fr. 2.52 per 100 words or fraction thereof.

201. In addition, a continuous listening service for distress signals will be maintained.

202. Radiotelegrams can be sent from ships to Chatham Islands to be relayed by that station to a coast station situated in New Zealand. A relaying rate of fc. 0.42 is charged in addition to the ordinary coast station tax due to the coast station on the New Zealand coast.

203. The station also communicates by radiotelegraphy with other stations in North Borneo.

204. If necessary.

205. Lighthouse.

206. La Romana and San Domingo also communicate with each other by radiotelegraphy. Charge per word : fr. 0.40 without a minimum. This charge is reduced to fr. 0.20 for telegrams sent on the service of the San Domingo Government.

207. For ordinary radiotelegrams.

208. For radiotelegrams sent on the service of the San Domingo Government.

209. Time of the meridian 90° west of Greenwich, attendance as follows :—

For limited Public Service with Mobile, the first 25 minutes of each hour from 6 a.m. to 6 p.m.

For General Public Service (working with ships), 25th to 30th minute of each hour from 6 a.m. to 6 p.m.

210. For radiotelegrams transmitted a distance exceeding 400 miles.

211. The station also communicates with Mobile (Alabama).

212. The station also communicates with Frankfort (Michigan).

213. The station also communicates with Grand Haven.

214. Operated by the United States War Department, Washington, D.C.

215. The station also communicates with Avalon (California).

216. The station also communicates with Koko Head KHJ (Hawaiian Islands), Juneau and Ketchikan (Alaska).

217. The station communicates only with Bolinas (California), Tahiti (French Oceania), and Funabashi (Japan).

218. Address and signature free of charge.

219. The station is limited to correspondence with Passagrille.

220. The station communicates only with Koko Head KIE (Hawaiian Islands).

221. The station communicates only with Scranton (Pennsylvania), and with stations on moving trains between Hoboken (New Jersey), and Buffalo (New York State).

222. The station also communicates with Fort Morgan (Alabama) WFM.

223. Time of the meridian 90° west of Greenwich, attendance as follows :—September 16th to October 1st, and June 7th to June 30th : sunset to sunrise. July 1st to September 15th : 1 a.m. to 6 a.m., 7 a.m. to noon, 1 p.m. to 6 p.m., 7 p.m. to midnight.

224. Time of the meridian 90° west of Greenwich, attendance as follows :—

For limited Public Service with Fort Morgan, the first 25 minutes of each hour from 6 a.m. to 6 p.m.

For General Public Service (working with ships), the last 35 minutes of each hour from 6 a.m to 6 p.m., and continuous service from 6 p.m. to 8.30 p.m.

225. Time of the meridian 75° west of Greenwich, attendance as follows :—September 16th to December 15th, and April 15th to June 2nd : 7 p.m. to midnight, 1 a.m. to 7 a.m. June 3rd to September 15th : 7 a.m. to noon, 1 p.m. to 6 p.m., 7 p.m. to midnight, 1 a.m. to 6 a.m.

226. Time of the meridian 120° west of Greenwich. The station is open during the first and last fifteen minutes of each hour, from 8 a.m. to 6 p.m.

227. For radiotelegrams exchanged with ships plying between New York City and points less than 200 miles distant by water.

228. The station also communicates with Burrwood and Colon.

229. The station only exchanges correspondence of private interest with Guantanamo (Cuba) and Bowden (Jamaica).

230. The station communicates only with Binghamton and with stations on moving trains between Hoboken (New Jersey) and Buffalo (New York State).

231. The station also communicates with San Diego KSD (California), Los Angeles (California), Portland KGN (Oregon), and Pearl Harbor (Hawaiian Islands).

232. The station also communicates with Los Angeles (California), San Diego (KSD (California), and Portland KGN (Oregon).

233. Time of the meridian 90° west of Greenwich, 7.15 a.m. to 8 a.m., 8.40 a.m. to 9 a.m., 10.15 a.m. to 10.55 a.m., 11.40 a.m. to noon, 1.15 p.m. to 2 p.m., 3.15 p.m. to 4 p.m., 5.15 p.m. to 6 p.m., 8.15 p.m. to 8.55 p.m., 10.15 p.m. to 11 p.m.

234. With the wavelength of 600 metres.

235. The station also exchanges correspondence with Nassau (Bahamas).

236. For radiotelegrams exchanged with ships making voyages between New York and ports not exceeding 200 miles distant.

237. For radiotelegrams exchanged with ships making voyages between ports on the American continent more than 200 miles distant from New York.

238. The station also communicates with South San Francisco and Portland KGN (Oregon).

239. The station is limited to correspondence with Lahaina.

240. The station communicates only with Seattle KPA (United States of America).

241. Continuous service is performed provisionally.

242. For press radiotelegrams.

243. The station is owned by the United States Government (Bureau of Lighthouses), but is operated and controlled by Snare and Triest Co.

244. The handling of correspondence is temporarily suspended, with the exception of distress messages and messages in plain language exchanged between officials or passengers of vessels and the agencies of such vessels, provided that they contain only matter relating to the affairs of the companies or passengers.

245. Italian Somaliland official time three hours in advance of Greenwich time. (Longitude 45° east of Greenwich.)

246. With the wave-length of 2,500 metres.

247. For radiotelegrams exchanged with ships subject to the administration of Australia or of New Zealand.

248. Meteorological radiotelegrams are exchanged with vessels free of charge.

249. For radiotelegrams exchanged with ships other than those subject to the administration of Australia or of New Zealand.

250. When necessary, or when requested by vessels, the station transmits weather forecasts.

251. The station will accept general public messages in emergencies, when open.

252. The stations *Choshi, Fukkikaku and Dairenwan* transmit warnings of typhoons, given by the Central Meteorological Office at Tokio for ships at sea. No charge is made for this transmission, except in cases where the warnings are transmitted specially at the request of ships.

The warnings are drawn up in the English language and contain the following particulars (A) or (B):

(A) Designation of the cause of alarm;
  day;
  time;
  position of the centre of the atmospheric depression or of the typhoon;
  height of the centre;
  direction of movement.

(B) District;
  designation of the cause of alarm;
  mention.

The warnings are transmitted by the coast stations immediately after their receipt at the stations. They are sent out again at 9.05 p.m. (mean time of the meridian 135° east of Greenwich) by *Choshi*, at 8.30 p.m. (mean time of the meridian 120° east of Greenwich) by *Fukkikaku*, and at 9 p.m. (mean time of the meridian 120° east of Greenwich) by *Dairenwan*.

The warnings are transmitted three times in succession on a wave-length of 600 metres. Their transmission is preceded by the signal Q S T sent three times.

253. No charge is made for relaying messages.

254. Coastal military station.

255. Operated by the United States Signal Corps, War Department, Washington, D.C.

256. Operated by the United States Naval Communication Service, Radio, Virginia.

257. The station is located at Navy Yard.

258. The station only communicates with the owner's yacht.

259. Operated by the Philippine Insular Government.

260. No charge is made for radiotelegrams to or from vessels of the United States Navy.

261. The station communicates only with Oakland (California).

262. Public correspondence is admitted on behalf of the crews of ships.

263. The station sends out information concerning dangers at sea (the presence of derelicts, displacement of aids to navigation, etc., etc.) four times daily, at 8 a.m., noon, 4 p.m., and 8 p.m. The station also sends local weather forecasts at noon and storm warnings four times daily, at the hours mentioned above. The station also furnishes the above information to passing ships at other hours on request.

264. The handling of public correspondence has been suspended, except in the case of private radiotelegrams addressed to the master of a ship by his charterers or *vice versa.*

265. Public correspondence with the Japanese ship stations. The station also communicates with the other coast stations in Japan.

266. When the cable is interrupted the station also exchanges correspondence with Australia.

267. The charge is reduced to 20 centimes for correspondence with ships engaged in a regular service on the coast of New Caledonia and Dependencies.

268. The Naval Observatory at Dársena Norte (through the Dársena Norte radiotelegraph station) sends out five time-signals each day (except Sundays and holidays) on the wave-length of 800 metres.

The method of transmission is as follows:

(*a*) from	1.55′.00″ to 1.55′.50″	(Greenwich mean time) a warning signal consisting of an unbroken series of dashes;
at	1.56′.00″	a dot representing the 1st time-signal.
(*b*) from	1.56′.15″ to 1.56′.50″	an unbroken series of dashes;
at	1.57′.00″	a dot representing the 2nd time-signal.
(*c*) from	1.57′.20″ to 1.57′.50″	an unbroken series of dashes;
at	1.58′.00″	a dot representing the 3rd time-signal.
(*d*) from	1.58′.25″ to 1.58′.50″	an unbroken series of dashes;
at	1.59′.00″	a dot representing the 4th time-signal.

(*e*) from 1.59′.30″ to 1.59′.50″ an unbroken series of dashes;
at 2.00′.00″ a dot representing the 5th and last time-signal.

Time-Signals	Greenwich time	Córdoba time
1st	1.56′.00″	9.39′.11,$_{78}$″
2nd	1.57′.00″	9.40′.11,$_{78}$″
3rd	1.58′.00″	9.41′.11,$_{78}$″
4th	1.59′.00″	9.42′.11,$_{78}$″
5th	2.00′.00″	9.43′.11,$_{78}$″

Duration of dot = ¼ second

269. The reception and despatch of messages may be suspended for short periods, and the station is subject to be closed at short notice.

270. The station is limited to correspondence with Denver (Colorado).

271. Operated by the United States Coast Guard, Treasury Department, Washington, D.C.

272. The station sends time signals daily at noon (time of the meridian 75° west of Greenwich) Sundays and holidays included, on the wave-length of 1,000 metres. The manner in which these time signals are transmitted is the same as that indicated in Note 157. Time furnished by the Naval Observatory, Washington, D.C.

273. The station sends time signals daily at noon (time of the meridian 120° west of Greenwich), Sundays and holidays excluded, on the wave-length of 2,000 metres. The manner in which these time signals are transmitted is the same as that indicated in Note 157. Time furnished by the Observatory at Navy Yard, Mare Island, California.

274. The station sends time signals daily at noon (time of the meridian 120° west of Greenwich), Sundays and holidays excluded. The manner in which these time signals are transmitted is the same as that indicated in Note 157. Time furnished by the Observatory at Navy Yard, Mare Island, California.

275. The station receives the time of the 8th time-belt (120° east of Greenwich) from the Observatory of Zikawei; and transmits it on the wave-length of 600 metres according to the following table:

from 10.53′ to 10.54′ a.m. preliminary signals
from 10.54′ to 10.54′.50″ a.m. a series of "G"
at 10.55′ a.m. a dot
from 10.56′ to 10.56′.50″ a.m. a series of "O"
at 10.57′ a.m. a dot
from 10.58′ to 10.58′.50″ a.m. a series of "X"
at 10.59′ a.m. a dot
from 4.53′ to 4.54′ p.m. preliminary signals
from 4.54′ to 4.54′.50″ p.m. a series of "G," etc., continuing as in the morning.

The time-signal, morning and evening, is followed immediately by a meteorological telegram.

During the typhoon season, the station transmits, in addition to these periodical messages, useful information on the state of the weather.

No charge is made for the meteorological observations.

276. The station only exchanges correspondence of private interest with other fixed stations.

277. The station communicates with the stations of the Red Salmon Canning Company. The station also exchanges correspondence with fixed stations.

278. The station only exchanges correspondence with other fixed stations.

279. The station also communicates with fixed stations.

280. The operator listens in at intermittent times on the hour and half hour.

281. Training school station. Operated by the Coast Artillery Corps, United States Army, Washington D.C.

282. The station is restricted to communication with the vessels *Marquette and Bessemer* No. 1, and *Marquette and Bessemer* No. 2.

283. Great Lakes training station.

284. Time of the meridian 75° west of Greenwich: 8.30 a.m., 9.30 a.m., 10.30 a.m., 11.30 a.m., 12.30 p.m., 1.30 p.m., 2.30 p.m., 3.30 p.m., 4.30 p.m.

285. The station is open approximately from April to October.

286. The station is limited to correspondence with the ship stations of the Alaska Packers' Association. The station also exchanges correspondence of private interest with other fixed stations.

287. The station is open only from the 1st July to the 20th August, approximately.

288. The station also communicates with Los Angeles (California).

289. Moored schooner.

290. The station is limited to correspondence with Nushagak KMG and Clark's Point.

291. The wave-lengths of 2,000 and 2,500 metres are used for messages exchanged with the neighbouring islands. The station replies on the wave-length of 2,500 metres to calls from distances exceeding 400 miles.

292. The station also communicates with Phœnix (Arizona), San Diego KSD (California), and San Francisco KFS.

293. The station is limited to correspondence with the Sitka and Juneau (Alaska) coast stations, and with ships of the Alaska Steamship Company and the Pacific Coast Steamship Company.

294. The station communicates only with Pittsburg (Kansas) and Wichita (Kansas).

295. The station communicates only with Pittsburg (Kansas) and Independence (Kansas).

296. The station communicates only with stations of the International Milling Co.

297. The station belongs to Marconi's Wireless Telegraph Company, London, and the Eastern Telegraph Company, London; it is operated and controlled by the latter company.

298. The coast charge given is applicable to radiotelegrams worded in plain Spanish language; for radiotelegrams in code or worded in a language other than Spanish the coast charge is doubled.

299. This station connects with the International Telegraph System through Port Etienne and Rufisque.

300. Certain islands in Australasia and the Pacific are connected with the International Telegraph system by radiotelegraphy at the points given hereunder:

(*a*) Apia (Samoa Islands)—through Awanui Radio, New Zealand (normal route) or Suva, Fiji Islands (alternative route).

(*b*) Flinders Island—through Melbourne Radio.

(*c*) Kieta (Bougainville, Solomon Islands)—through Woodlark Island and Townsville Radio.

(*d*) King Island—through Melbourne Radio.

(*e*) Macquarie Island—through Hobart Radio.

(*f*) Madang (British New Guinea)—through Port Moresby and Thursday Island Radio.

(*g*) Nauru (Marshall Islands)—through Woodlark Island and Townsville Radio.

(*h*) Ocean Island (Gilbert Islands)—through Nauru, Woodlark Island and Townsville Radio.

(*i*) Papeete (Tahiti, French Oceania)—through Apia (Samoa Islands), and Awanui Radio, New Zealand.

(*j*) Port Moresby (British New Guinea)—through Thursday Island.

(*k*) Rabaul (New Britain)—through Woodlark Island and Townsville Radio.

(*l*) Tulagi (Solomon Islands)—through Woodlark Island and Townsville Radio.

(*m*) Woodlark Island—through Townsville Radio.

301. This station also exchanges public correspondence with Juneau, Ketchikan, Sitka, and Wrangell (Alaska).

302. This station also communicates with Cordova, Kodiak, and Sitka (Alaska).

303. This station also exchanges public correspondence with Latouche (Alaska).

SHIP STATIONS

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
ARGENTINE (REPUBLIC)							Francs.	Francs.
Alferez Mackinlay	LNB	—	Navy	450, **600**	O	N	—	—
Almirante Brown	LKA	—	Navy	450, **600**	O	N	—	—
Argentino LMS [80]	LMS	260	Soc. Impta. y Expta. de la Patagonia	300, **600**	P G	N	0.40	4.00
Asturiano [80]	LMT	260	Soc. Impta. y Expta. de la Patagonia	300, **600**	P G	N	0.40	4.00
Azopardo	LNF	—	Navy	300, 450, **600**	O	N	—	—
Belgrano LKB	LKB	—	Navy	450, **600**	O	N	—	—
Berna [80]	LLN	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
Bruselas [80]	LLO	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
Buenos Aires LKC	LKC	—	Navy	450, **600**	O	N	—	—
Buenos Aires LLP [80]	LLP	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
Cabo Corrientes [80]	LMO	300	A. M. Delfino y Hermano (Hamburg Sud-Am. D. S. Ges.)	300, **600**	P G	N	0.40	4.00
Cabo Santa Maria [80]	LMN	300	A. M. Delfino y Hermano (Hamburg Sud-Am. D. S. Ges.)	300, **600**	P G	N	0.40	4.00
Camarones [80]	LME	600	A. M. Delfino y Hermano (Hamburg Sud-Am. D. S. Ges.)	300, 450, **600**	P G	N	0.40	4.00
Catamarca	LKD	—	Navy	450, **600**	O	N	—	—
Chaco [130]	LKE	—	Government	450, **600**	O	N	—	—
Colonia [80]	LLQ	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
Cordóba LKF	LKF	—	Navy	450, **600**	O	N	0.40	4.00
Corrientes LNG	LNG	—	Navy	**300**, 450	O	N	—	—
Draga 13	LNL	55	Government (Dept. of Public Works)	400	O	X	—	—
Draga 14.C	LNK	60	Government	400	O	X	—	—
Draga 16.C	LMQ	100	Government	450	O	9 a.m. to 11 a.m., 3 p.m. to 5 p.m.	—	—
Draga 209	LLH	—	Government	500	O	N	—	—
Draga 210	LLI	—	Government	500	O	N	—	—
Draga 211	LLJ	—	Government	500	O	N	—	—
Draga 212.C	LMW	216	Government	2,000	O	9 a.m. to 11 a.m., 3 p.m. to 5 p.m.	0.40	4.00
El Plata LKG	LKG	—	Navy	450, **600**	O	N	—	—
Eolo [illegible]	[illegible]		Navy	450, **600**	O	N	—	—
			(Nicolás Mihanovich), Ltd.			N	0.40	4.00

Espora	LKI	—	Navy	[illegible]	P G	N	0.40	4.00
Fragata Sarmiento	LKJ	—	Navy	450, 600	O	N	—	—
Garibaldi LKK	LKK	—	Navy	450, 600	O	N	—	—
Gaviota	LKL	—	Navy	450, 600	O	N	—	—
Guarany [80]	LLS	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 600	P G	N	0.40	4.00
Guardia Nacional [130]	LKM	—	Government	450, 600	O	N	—	—
Humaitá [80]	LMV	150	Domingo Barthe	300, 600	P G	N	0.40	4.00
Independencia	LKN	—	Navy	450, 600	O	N	—	—
Juanita	LMX	500	S.A. de Navigation Sud Atlantica	300, 600	P G	7 a.m. to 11 a.m., 1 p.m. to 5 p.m.	0.40	4.00
Jujuy	LKO	—	Navy	450, 600	O	N	—	—
Lambaré [80]	LLV	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd,	300, 600	P G	N	0.40	4.00
La Plata LKP	LKP	—	Navy	450, 600	O	N	—	—
Libertad	LKQ	—	Navy	450, 600	O	N	—	—
Lisboa [80]	LLM	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 600	P G	N	0.40	4.00
Londres [80]	LLW	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 600	P G	N	0.40	4.00
Los Andes LKR	LKR	—	Navy	450, 600	O	N	—	—
Madrid [80]	LLY	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 600	P G	N	0.40	4.00
Maipú	LKS	—	Navy	450, 600	O	N	—	—
Misiones	LNH	—	Navy	300, 450	O	N	—	—
Ministro Escurra	LNA	—	Government	450, 600	O	N	—	—
Moinho Fluminense	LNI	135	S.A. de Navigation Sud Atlantica	300, 600	P G	N	0.40	4.00
Moreno	LKT	—	Navy	600–1,500	O	N	—	—
9 de Julio	LKU	—	Navy	450, 600	O	N	—	—
Ona	LNC	—	Government	450, 600	O	N	—	—
Pampa LKV [130]	LKV	—	Government	450, 600	O	N	—	—
Pampero	LLK	—	Government	300	O	N	0.40	4.00
Paraná LKW	LKW	—	Navy	450, 600	O	N	—	—
Patagonia LKX	LKX	—	Navy	450, 600	O	N	—	—
Patria LKY	LKY	—	Navy	450, 600	O	N	—	—
Piedrabuena	LKZ	—	Navy	300, 450, 600	O	N	—	—
Pomona	LMY	500	S.A. de Navigation Sud Atlantica	300, 600	P G	7 a.m. to 11 a,m., 1 p.m. to 5 p.m.	0.40	4.00
Presidente Mitre [80]	LMG	600	A. M. Delfino y Hermano (Hamburg Sud-Am. D.S. Ges.)	300, 450, 600	P G	N	0.40	4.00
Presidente Quintana [80]	LMH	600	A. M. Delfino y Hermano (Hamburg Sud-Am. D.S. Ges.)	300, 450, 600	P G	N	0.40	4.00
1° de Mayo	LLA	—	Navy	450, 600	O	N	—	—
Pueyrredón	LLB	—	Navy	450, 600	O	N	—	—
Querandi	LND	—	Government	450, 600	O	N	—	—
Rio de la Plata LMI	LMI	150	Compañia de Nav. Santiago Lambruschini, Ltd.	300, 600	O	N	0.40	4.00
Rio Uruguay	LMJ	150	Compañia de Nav. Santiago Lambruschini, Ltd.	300, 600	O	N	0.40	4.00
Rivadavia	LLC	—	Navy	600–1,500	O	N	—	—
Roma LMA [80]	LMA	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, 600	P G	N	0.40	4.00
Rosario LLD	LLD	—	Navy	450, 600	O	N	—	—
San Martin LLE	LLE	—	Navy	450, 600	O	N	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
ARGENTINE (REPUBLIC) —*contd.*							Francs.	Francs.
San Martin LMM [80]	LMM	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
Toro LMP [80]	LMP	500	S.A. de Navigation Sud Atlantica	300, **600**	P G	7 a.m. to 11 a.m., 1 p.m. to 5 p.m.	0.40	4.00
Uruguay LLF	LLF	—	Navy	450, **600**	O	N	—	—
Vapor 118.B	LLL	—	Government	500	O	N	—	—
25 de Mayo	LLG	—	Navy	450, **600**	O	N	—	—
Venus LMC [80]	LMC	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
Vicente Fidel Lopez	LMR	80	Navy	350, 450, **600**	O	X	—	—
Viena [80]	LMD	135	Compañia Argentina de Nav. (Nicolás Mihanovich), Ltd.	300, **600**	P G	N	0.40	4.00
AUSTRALIAN COMMONWEALTH								
Australia VKA	VKA	—	Navy	600	O	—	—	—
Bombala [81]	VHF	250	Australian Steamships, Ltd.	300, **600**	P G	Limited	0.20	—
Brisbane VKB	VKB	—	Navy	600	O	—	—	—
Canberra [81]	VHO	250	Australian Steamships, Ltd.	300, **600**	P G	Limited	0.20	—
Cerberus	VKO	—	Government	600	O	—	—	—
Cockburn Sound Base	VKR	—	Government	600	O	—	—	—
Cooma [81]	VJE	250	Australian Steamships, Ltd.	300, **600**	P G	Limited	0.20	—
Derwent VKK	VKK	—	Navy	600	O	—	—	—
Dimboola [81]	VHL	240	Melbourne S.S. Co.	300, **600**	P G	Limited	0.20	—
Encounter	VKE	—	Navy	600	O	—	—	—
Fiona [80]	VHQ	240	Colonial Sugar Refining Co.	300, **600**	P G	—	0.20	—
Flinders Island Base	VKP	—	Government	600	O	—	—	—
Garden Island Base	VKQ	—	Government	600	O	—	—	—
Indarra [81]	VHP	240	Australasian United S.N. Co.	300, **600**	P G	Limited	0.20	—
Kanowna [81]	VHD	250	Australasian United S.N. Co.	300, **600**	P G	Limited	0.20	—
Karoola [81]	VHE	240	McIlwraith, McEacharn's Line Prop'ry., Ltd.	300, **600**	P G	Limited	0.20	—
Katoomba [81]	VHN	300	McIlwraith, McEacharn's Line Prop'ry, Ltd.	300, **600**	P G	Limited	0.20	—
Kyarra [81]	VHC	250	Australasian United S.N. Co.	300, **600**	P G	Limited	0.20	—
Levuka [81]	VHB	250	Australasian United S.N. Co.	300, **600**	P G	Limited	0.20	—
Mataram [81]	VHU	240	Burns, Philp & Co.	300. **600**	P G	Limited	0.20	—
Matunga [81]	VHV	240	Burns, Philp & Co.	300, **600**	P G	Limited	0.20	—
Melbourne VKC	VKC	—	Navy	600	O	—	—	—
				300, **600**	P G	Limited	0.20	—

Navy Office	VKN	—	Government	600	O ..	..		—		—	—
Parramatta	VKJ	—	Navy	600	O ..	..		—		—	—
Pioneer VKF	VKF	—	Navy	600	O ..	..		—		—	—
Port Stevens Base	VKS	—	Government	600	O ..	..		—		—	—
Protector	VKG	—	Navy	600	O ..	..		—		—	—
Riverina [81]	VJA	250	Huddart Parker, Ltd.	300, 600	P G	..	Limited	..	..	0.20	—
Stuart	VHS	Day, 100; night, 300	Government	300	O ..	..		—		—	—
Suva [81]	VJI	200	Australasian United S.N. Co. ..	300, 600	P G	..	Limited	..	..	0.20	—
Swan	VKM	—	Navy	600	O ..	..		—		—	—
Sydney VKD	VKD	—	Navy	600	O ..	..		—		—	—
Torrens	VKL	—	Navy	600	O ..	..		—		—	—
Ulimaroa [81]	VHY	250	Huddart Parker, Ltd.	300, 600	P G	..	Limited	..	..	0.20	—
Victoria VHX [81]	VHX	250	Huddart Parker, Ltd.	300, 600	P G	..	Limited	..	..	0.20	—
Wandilla [81]	VHI	240	Adelaide S.S. Co.	300, 600	P G	..	Limited	..	..	0.20	—
Warilda [81]	VHH	240	Adelaide S.S. Co.	300, 600	P G	..	Limited	..	..	0.20	—
Warrego	VKH	—	Navy	600	O ..	..		—		—	—
Westralia [81]	VJB	250	Huddart Parker, Ltd.	300, 600	P G	..	Limited	..	..	0.20	—
Willochra [81]	VHG	240	Adelaide S.S. Co.	300, 600	P G	..	Limited	..	..	0.20	—
Wimmera [81]	VHZ	250	Huddart Parker, Ltd.	300, 600	P G	..	Limited	..	..	0.20	—
Wyandra [81]	VHW	240	Australasian United S.N. Co. ..	300, 600	P G	..	Limited	..	..	0.20	—
Wyreema [81]	VJG	200	Australasian United S.N. Co. ..	300, 600	P G	..	Limited	..	..	0.20	—
Yarra VKI	VKI	—	Navy	600	O ..	..		—		—	—
Zealandia VJC[81]	VJC	240	Huddart Parker, Ltd.	300, 600	P G	..	Limited	..	..	0.20	—
AUSTRIA [120]											
Africa OLA [1]	OLA	Day, 400; night, 700	Austrian Lloyd [7]	300, 450, 600	P G	..		X		0.40	4.00
Alice OKI [1]	OKI	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, 600	P G	..		N [2] X [3]		0.40	4.00
Argentina [1]	OKG	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, 600	P G	..		N [2] X [3]		0.40	4.00
Austria [1]	OLU	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, 600	P G	..		X		0.40	4.00
Belvedere [1]	OKB	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, 600	P G	..		N [2] X [3]		0.40	4.00
Bohemia OLB [1]	OLB	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, 600	P G	..		X		0.40	4.00
China OLC [1]	OLC	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, 600	P G	..		X		0.40	4.00
Cleopatra [1]	OLL	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, 600	P G	..		X		0.40	4.00
Columbia OKC [1]	OKC	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, 600	P G	..		N [2] X [3]		0.40	4.00
Erzherzog Franz Ferdinand OLE [1]	OLE	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, 600	P G	..		X		0.40	4.00
Francesca [1]	OKF	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, 600	P G	..		N [2] X [3]		0.40	4.00
Gablonz [1]	OLG	Day 400; night, 700	Austrian Lloyd [9]	300, 450, 600	P G	..		X		0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
AUSTRIA [120]—*contd.*							Francs.	Francs.
Habsburg OLR [1]	OLR	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, **600**	P G ..	X	0.40	4.00
Helouan [1]	OLH	Day, 150; night, 250	Austrian Lloyd [6]	300, 450, **600**	P G ..	X	0.30	3.00
Kaiser Franz Josef I OKK [1]	OKK	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, **600**	P G ..	N	0.40	4.00
Laura [1]	OKL	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, **600**	P G ..	N [2] X [3]	0.40	4.00
Marienbad [1]	OLM	Day, 400; night, 700	Austrian Lloyd [9]	300, 450, **600**	P G ..	X	0.40	4.00
Martha Washington [1] ..	OKM	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, **600**	P G ..	N [2] X [3]	0.40	4.00
Mercédès II. [4 80]	OMA	Day, 150; night, 250	M. E. Jellinek Mercédes	300	P	X	—	—
Nippon [1]	OLN	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, **600**	P G ..	X	0.40	4.00
Oceania [1]	OKO	Day, 400; night, 700	Unione Austriaca di Nav.[8] ..	300, 450, **600**	P G ..	N [2] X [3]	0.40	4.00
Österreich [1]	OMC	Day, 150; night, 250	Austrian Antarctic Expedition ship	300,450, **600** [82]	P G ..	X	0.40	4.00
Persia OLP [1]	OLP	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, **600**	P G ..	X	0.40	4.00
Semiramis [1]	OLS	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, **600**	P G ..	X	0.40	4.00
Silesia OLJ [1]	OLJ	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, **600**	P G ..	X	0.40	4.00
Sofia Hohenberg [1]	OKH	Day, 400; night, 700	Unione Austriaca di Nav.[8].. ..	300, 450, **600**	P G ..	N [2] X [3]	0.40	4.00
Thalia [1]..	OLI	Day, 150; night, 250	Austrian Lloyd [5]	300, 450, **600**	P G ..	X	0.40	4.00
Trieste [1]..	OLT	Day, 150; night, 250	Austrian Lloyd [7]	300, 450, **600**	P G ..	X	0.40	4.00
Venezia OMB [1 5]	OMB	Day, 100	Soc. Anon. di Nav. Rimorchi e Salvataggi (D. Tripcovich & Co.)	300, **600**	P G ..	8 a.m. to midday, 2 p.m. to 6 p.m.	0.10	1.00
Wien OLW [1]	OLW	Day, 150; night, 250	Austrian Lloyd [6]	300, 450, **600**	P G ..	X	0.30	3.00
AUSTRIA-HUNGARY [121]								
				600	O [22] ..	N	— [23]	— [23]

Arpád ..	UOD	—	Navy					600	O [22]		N	[23]	[23]
Babenberg	UOQ	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Balaton..	UOV	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [illegible]	— [23]
Bodrog	UOY	—	Navy	..	..	..	..	—	—		—	—	—
Budapest	UPB	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Chamäleon	UPC	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Csepel	UPL	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Csikós	UPO	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Dinara	UPR	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Erzherzog Ferdinand Max ..	UPZ	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Erzherzog Franz Ferdinand UPW	UPW	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Erzherzog Friedrich	UQF	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Erzherzog Karl	UQK	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Gäa	UQX	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Habsburg URN	URN	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Helgoland URM	URM	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Herkules	URR	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Huszar	URU	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Kaiser Franz Joseph I. USJ	USJ	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Kaiserin und Königin Maria Theresia	USQ	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Kaiser Karl VI.	USC	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Lacroma	USW	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Lussin	UTC	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Magnet UTG	UTG	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Miramar UTM	UTM	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Monarch UTO	UTO	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Novara UTV	UTV	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Orjen	UTX	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Pandur	UUB	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Panther UUD	UUD	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Pelikan UUK	UUK	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Pola UUL	UUL	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Prinz Eugen	UUN	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Radetzky	UUS	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Réka	UUW	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Saida	UVA	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Satellit	UVD	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Scharfschütze	UVH	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
S. Georg	UVG	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Streiter	UVJ	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Szigetvár	UVO	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Tátra UVW	UVW	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Taurus	UVY	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Tegetthoff	UWB	—	Navy	..	..	..	..	600	O [22]	..	N	— [23]	— [23]
Teodo	UWJ	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Trabant	UWK	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Turul	UWP	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Ulan	UWU	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Uskoke	UWZ	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Velebit	UXL	—	Navy	..	..	..	..	300, 600	O [22]	..	N	— [23]	— [23]
Vesta UXS	UXS	—	Navy	..	..	..	..	—	O [22]	..	N	— [23]	— [23]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
AUSTRIA-HUNGARY[121]—*contd*							Francs.	Francs.
Viribus unitis	UXV	—	Navy	600	O [22]	N	— [23]	— [23]
Wien UYA	UYA	—	Navy	300, **600**	O [22]	N	— [23]	— [23]
Wildfang	UYF	—	Navy	300, **600**	O [22]	N	— [23]	— [23]
Zrinyi	UYY	—	Navy	600	O [22]	N	— [23]	— [23]
BELGIUM								
Albertville [11]	OTV	200	Cie Belge Maritime du Congo	300, 450, **600**	P G	N	0.40	4.00
Anversville [11]	ONV	200	Cie Belge Maritime du Congo	300, 450, **600**	P G	N	0.40	4.00
Elbruz [11 91]	OOE	—	S.A. d'Armement d'Industrie et de Com.	—	—	—	0.40	4.00
Elisabethville [11]	OSV	200	Cie Belge Maritime du Congo	300, 450, **600**	P G	N	0.40	4.00
Escaut [80 136]	OSE	100–150	Armement Deppe	300, **600**	P G	N	—	—
Gothland [11]	ORG	—	Red Star Line	300, **600**	P G	—	0.40	4.00
Grand Remorqueur [96 114]	OSR	30–50	Government	500–600	O	X	—	—
Jan Breydel [12]	ONJ	60	Government	300	P R [13]	— [14]	— [15]	— [15]
L'Avenir [11, 24]	ONE	170	Association Maritime Belge	300, 450, **600**	P G	N	0.40	4.00
Léopold II. [12]	OPD	60	Government	300	P R [13]	— [14]	— [15]	— [15]
Lydie [80 136]	OSL	100–150	Armement Deppe	300, **600**	P G	N	—	—
Pieter De Coninck [12]	OPK	60	Government	300	P R [13]	— [14]	— [15]	— [15]
Princesse Clémentine [12]	OPC	60	Government	300	P R [13]	— [14]	— [15]	— [1]
Princesse Elisabeth [12]	OPE	60	Government	300	P R [13]	— [14]	— [15]	— [15]
Princesse Henriette [12]	OPH	60	Government	300	P R [13]	— [14]	— [15]	— [15]
Rapide (Le) [12]	OPR	60	Government	300	P R [13]	— [14]	— [15]	— [15]
Samland [11]	ORS	—	Red Star Line	300, **600**	P G	—	0.40	4.00
Stad Antwerpen [12]	OPA	60	Government	300	P R [13]	— [14]	— [15]	— [15]
Ville de Liège [12]	OPL	60	Government	300	P R [13]	— [14]	— [15]	— [15]
BRAZIL								
Acre [83]	SRF	250	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Alagôas	SNA	60	Navy	300	O [111]	—	0.40	—
Almirante Jaceguay [83]	SRX	190	Lloyd Brazileiro	300, **600**	P G	N	0.40	—
Amazonas	SOA	60	Navy	300	O [111]	—	0.40	—
[illegible]	[illegible]	[illegible]	[illegible]	[illegible], **600**	P G	X	0.40	—

Bahia SNB	SNB	150	Navy	600	O [111]	—	0.40	—
Barroso	SOB	150	Navy	600	O [111]	—	0.40	—
Benjamin Constant	SOC	150	Navy	600	O [111]	—	0.40	—
Brazil SRM [83]	SRM	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Cannavieiras [83]	PUO	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Carioca	SOV	30	Government	150	O [111]	—	0.40	—
Carlos Gomes	SOE	80	Government	300	O [111]	—	0.40	—
Ceará [83]	SRD	250	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Commandatuba [83]	PUQ	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Deodoro	SND	150	Navy	600	O [111]	—	0.40	—
Floriano	SNF	150	Navy	600	O [111]	—	0.40	—
Guararapes [83]	PUT	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Ilheos [83]	PUN	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Iris SRU [83]	SRU	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Itagiba [83]	STF	250	Cia Nac. de Navegaçao Costeira	300, **600**	P G	X	0.40	4.00
Itajuba [83]	STG	240	Cia Nac. de Navegaçao Costeira	**300**, 600	P G	N	0.40	4.00
Itapema [83]	STH	240	Cia Nac. de Navegaçao Costeira	**300**, 600	P G	N	0.40	4.00
Itapuca [83]	STI	240	Cia Nac. de Navegaçao Costeira	**300**, 600	P G	N	0.40	4.00
Itapuhy [83]	STD	250	Cia Nac. de Navegaçao Costeira	300, **600**	P G	X	0.40	4.00
Itapura [83]	STA	250	Cia Nac. de Navegaçao Costeira	300, **600**	P G	X	0.40	4.00
Itaquera [83]	STE	250	Cia Nac. de Navegaçao Costeira	300, **600**	P G	X	0.40	4.00
Itassucê [83]	STC	250	Cia Nac. de Navegaçao Costeira	300, **600**	P G	X	0.40	4.00
Itatinga [83]	STB	250	Cia Nac. de Navegaçao Costeira	300, **600**	P G	X	0.40	4.00
Itauba [83]	STJ	240	Cia Nac. de Navegaçao Costeira	**300**, 600	P G	N	0.40	4.00
Jaguarão	SOJ	30	Navy	100	O [111]	—	0.40	—
Javary [83]	SRY	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Jequitinhonha [83]	PUP	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Ladario [83]	SRN	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Laguna [83]	SRI	150	Lloyd Brazileiro	**300**, 600	P G	N	0.40	—
Laurindo Pitta	SNL	50	Government	300	O [111]	—	0;40	—
Manáos [83]	SRS	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Marahu [83]	PUR	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Maranhão [83]	SRK	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Matto Grosso	SOG	60	Navy	300	O [111]	—	0.40	—
Mercêdés SRO [83]	SRO	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Minas Geraes SNM	SNM	450	Navy	600	O [111]	—	0.40	—
Minas Geraes SRB [83]	SRB	250	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Olinda [83]	SRL	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Oyapock [83]	SRP	190	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Para SNE	SNE	60	Navy	300	O [111]	—	0.40	—
Para SRQ [83]	SRQ	250	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Parahyba	SOP	60	Navy	300	O [111]	—	0.40	—
Paraná SNH	SNH	60	Navy	300	O [111]	—	0.40	—
Piauhy	SOY	60	Navy	300	O [111]	—	0.40	—
Porto Seguro [83]	PUS	150	Navegaçao Bahiana	300, **600**	P G	X	0.40	—
Prudente de Moraes [83]	SRV	150	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Republica SOU	SOU	60	Navy	300	O [111]	—	0.40	—
Rio de Janeiro SRA [83]	SRA	250	Lloyd Brazileiro	300, **600**	P G	X	0.40	—
Rio Grande do Norte	SNS	60	Navy	300	O [111]	—	0.40	—
Rio Grande do Sul	SOR	150	Navy	600	O [111]	—	0.40	—
Ruy Barbosa [83]	SRT	190	Lloyd Brazileiro	**300**, 600	P G	N	0.40	—
Santa Catharina	SNK	60	Navy	300	O [111]	—	0.40	—
Sao Paulo SNP	SNP	450	Navy	600, 1,200	O [111]	—	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
BRAZIL—*contd.*							Francs.	Francs.
Sao Paulo SRC [83]	SRC	250	Lloyd Brazileiro	300, **600**	P G ..	X	0.40	—
Sargento Albuquerque ..	SOK	50	Government	300	O [111] ..	—	0.40	—
Satellite [83]	SRG	150	Lloyd Brazileiro	300, **600**	P G ..	X	0.40	—
Sergipe SNO	SNO	60	Navy	300	O [111] ..	—	0.40	—
Sergipe SRH [83]	SRH	150	Lloyd Brazileiro	300, **600**	P G ..	X	0.40	—
Servulo Dourado [83]	SRR	150	Lloyd Brazileiro	300, **600**	P G ..	X	0.40	—
Sirio [83]	SRW	150	Lloyd Brazileiro	300, **600**	P G ..	X	0.40	—
Sousmarin F 1	SOW	25	Navy	150	O [111] ..	—	0.40	—
Sousmarin F 3	SOX	25	Navy	150	O [111] ..	—	0.40	—
Sousmarin F 5	SOZ	25	Navy	150	O [111] ..	—	0.40	—
Tamandaré	SNX	50	Navy	300	O [111] ..	—	0.40	—
Tamoyo..	SNT	100	Navy	300	O [111] ..	—	0.40	—
Tiradentes	SOT	50	Navy	300	O [111] ..	—	0.40	—
Tupy	SNU	150	Navy	300	O [111] ..	—	0.40	—
Tymbira	SNY	100	Navy	300	O [111] ..	—	0.40	—
BRITISH INDIA								
Dufferin [80]	VUB	250	Government (Royal Indian Marine)	300, **600**, 1,000	P G ..	N	0.40	—
Hardinge [80]	VUC	250	Government (Royal Indian Marine)	300, **600**, 1,000	P G ..	N	0.40	—
Northbrook [80]	VUD	200	Government (Royal Indian Marine)	300, 430, **600**, 1,000	P G ..	N	0.40	—
CANADA AND NEWFOUNDLAND								
Aberdeen [18]	VDG	100	Government	300	O	X	—	—
Acadia [16]	VDT	200	Government	300, **600**	O	X	—	—
Adventure VOK [17]	VOK	150	Harvey & Co.	300, **600**	P G ..	X	0.40	4.00
Alberta VFQ [17]	VFQ	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Algerine [17]	VOL	150	—	300, **600**	P G ..	X	0.40	4.00
Aquilo [4] [80]	VFU	80	B. D, Rogers, Vancouver	300	P	X	—	—
Aranmore VDQ [18]	VDQ	200	Government	300, **600**	O	X	—	—
Assiniboia [17]	VGI	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Athabasca [17]	VGG	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
[illegible]	VOM	[illegible]	Harvey & Co.	300, **600**	P G ..	X	0.40	4.00

Boston VFS [17]	VFS	200	Boston & Yarmouth S.S. Co. ..	300, 600	P G ..	N	0.40	4.00
Camosun [80]	VFZ	200	Union S.S. Co. of B.C.	300, 600	P G ..	N	0.40	4.00
Canada VDC [16]	VDC	150	Government	300, 600	O	X	—	—
Cascapedia [17]	VEO	200	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Cayuga [17]	VEL	100	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Chelohsin [80]	VGN	200	Union S.S. Co. of B.C.	300, 600	P G ..	N	0.40	4.00
Chicora [17]	VEJ	100	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Chippewa [17]	VEH	100	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Corona [17]	VEB	100	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Dalhousie City [17]	VEA	100	Niagara, St. Catherines and Toronto Nav. Co.	300, 600	P G ..	N	0.40	4.00
Deliverance [80]	VFF	100	Southern Salvage Co.	300, 600	P	X	—	—
Dollard [18]	VDO	150	Government	300	O	X	—	—
Douglass H. Thomas [17] ..	VGR	125	Dominion Coal Co.	300, 600	P G ..	N	0.40	4.00
Druid VDH [18] :	VDH	100	Government	300, 600	O	X	—	—
Durley Chine [19]	VDY	200	Government	300, 600	O	X	—	—
Eagle VOU [17]	VOU	150	Bowring Bros.	300, 600	P G ..	X[78]	0.40	4.00
Empire [17 119]	VFP	200	Canadian Towing & Wrecking Co.	300, 600	P G ..	N	0.40	4.00
Estevan [18]	VDN	200	Government	300, 600	O	X	—	—
Everett G. Griggs [80]	VGQ	100	Everett G. Griggs Ship Co. ..	300, 600	P G ..	X	0.40	4.00
Florence [4 80]	VFT	150	T. Eaton, ...	300, 600	P	X	—	—
Galiano [16]	VDV	200	**Government**	300, 600	O	X	—	—
Garden City [17]	VEI	100	Niagara, St. Catherines and Toronto Nav. Co.	300, 600	P G ..	N	0.40	4.00
Halifax [17]	VGP	200	Canada Atlantic & Plant S.S. Co.	300, 600	P G ..	N	0.40	4.00
Hamonic [17]	VGD	200	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Hazel Dollar [17]	VEE	200	Dollar S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Huronic [17]	VGE	200	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Keewatin [17]	VGC	200	Canadian Pacific Railway Co. ..	300, 600	P G ..	N	0.40	4.00
Kingston [17]	VEC	100	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Kyle [80]	VOR	150	Reid Newfoundland Co.	300, 600	P G ..	X	0.40	4.00
Lady Evelyn [84]	VDX	100	Government	300, 600	O	X	—	—
Lady Grey [18]	VDL	100	Government	300	O	X	—	—
Lady Laurier [18]	VDF	150	Government	300	O	N	—	—
Lord Strathcona [17 112]	VFX	80	Quebec Salvage & Wrecking Co. ..	300	P G ..	X	0.40	4.00
Macassa [17]	VEK	100	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Majestic VEM [17]	**VEM**	**100**	**Canada S.S. Lines, Ltd.**	**300, 600**	P G ..	N	**0.40**	**4.00**
Malaspina [16]	VDU	200	Government	300, 600	O	X	—	—
Manitoba [17]	VGH	200	Canadian Pacific Railway Co. ..	300, 600	P G ..	N	0.40	4.00
Margaret [10]	VDW	200	Government	300, 600	O	X	—	—
Montcalm VDJ [18]	**VDJ**	**150**	Government	300, 600	O	X	—	—
Neptune VOX [17]	VOX	150	Job Bros.	300, 600	P G ..	X	0.40	4.00
Newington [18]	VDP	100	Government	300	O	X	—	—
Niobe VDA [16]	VDA	—	Navy	—	O	—	—	—
Noronic [17]	VGW	200	Canada S.S. Lines, Ltd.	300, 600	P G ..	N	0.40	4.00
Ontario No. 1[86]	VGU	300	Ontario Car Ferry Co., Ltd. ..	300, 600	P G ..	N	0.10	1.00
Prince Albert [80]	VFL	200	Grand Trunk Pacific Development Co.	300, 600	P G ..	N	0.40	4.00
Prince Arthur [17]	VGJ	200	Boston & Yarmouth S.S. Co. ..	300, 600	P G ..	N	0.40	4.00
Prince George VGK [17] ..	VGK	200	Boston & Yarmouth S.S. Co. ..	300, 600	P G ..	N	0.40	4.00
Prince John [80]	VFM	200	Grand Trunk Pacific DevelopmentCo.	300, 600	P G ..	N	0.40	4.00
Princess Adelaide [17]	VFA	200	Canadian Pacific Railway Co. ..	300, 600	P G ..	N	0.40	4.00
Princess Alice VFD [17] ..	VFD	200	Canadian Pacific Railway Co. ..	300, 600	P G ..	N	0.40	4.00

Ship Stations—*Continued*

Name	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
CANADA AND NEWFOUNDLAND—*contd.*							Francs.	Francs.
Princess Beatrice [17]	VFC	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Charlotte [17]	VFE	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Ena [17]	VFJ	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Maquinna [17]	VGT	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Margaret [17]	—	—	Canadian Pacific Railway Co. ..	300, **600**	P G ..	—	—	—
Princess Mary [17]	VFB	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess May [17]	VFH	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Patricia [80]	VGZ	100	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Royal VFG [17] ..	VFG	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Princess Sophia [17]	VFI	200	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
Province [17 119]	VFR	200	Canadian Towing & Wrecking Co.	300, **600**	P G ..	N	0.40	4.00
Quadra [18]	VDM	100	Government	300	O	X	—	—
Rainbow VDB [16]	VDB	—	Navy	—	O	—	—	—
Rapids King [86]	VEG	200	Canada S.S. Lines, Ltd.	300, **600**	P G ..	N	0.10	1.00
Salvor [80]	VFV	200	B.C. Salvage Co.	300, **600**	P G ..	X	—	—
Saronic [17]	VGF	200	Northern Navigation Co. ..	300, **600**	P G ..	N	0.40	4.00
Seal [17]	VGV	200	Halifax Trading & Sealing Co. ..	300, **600**	P G ..	N	0.40	4.00
Sheba [18]	VDZ	200	Government	300, **600**	O	X	—	—
Simcoe [18]	VDS	100	Government	300, **600**	O	X	—	—
St. Ignace [17 119]	VGL	125	Canadian Towing & Wrecking Co.	300	P G ..	N	0.40	4.00
Stanley [18]	VDE	150	Government	300, **600**	O	X	—	—
Syracuse [86]	VEF	200	Canada S.S. Lines, Ltd.	300, **600**	P G ..	N	0.10	1.00
Tees [17]	VFK	200	Canadian Pacific Railway Co. ..	300	P G ..	8 a.m. to 8 p.m.	0.40	4.00
Toronto VED [17]	VED	100	Canada S.S. Lines, Ltd.	300, **600**	P G ..	N	0.40	4.00
Turbinia VEN [86]	VEN	200	Canada S.S. Lines, Ltd.	300, **600**	P G ..	N	0.10	1.00
Venture [80]	VGX	200	Union S.S. Co. of B.C.	300, **600**	P G ..	N	0.40	4.00
Yarmouth VGY [17]	VGY	100	Canadian Pacific Railway Co. ..	300, **600**	P G ..	N	0.40	4.00
CHILI								
Aysen [44]	CAA	250	Compania Sud-Amer. de Vapores	300, **600**	P G ..	X	0.40	4.00
Baquedano	CBQ	—	Navy	—	O	—	—	—
Blanco	CBB	—	Navy	—	O	—	—	—
Cachapoal [44]	CAC	250	Compania Sud-Amer, de Vapores	300, **600**	P G ..	X	0.40	4.00
Casma [130]	CBK	—	Government	—	O	—	—	—
Chacabuco	CBA	—	Navy	—	O	—	—	—
Cochrane CBC	CBC	—	Navy	—	O	—	—	—
[illegible]	CBD	—	Navy	—	O	—	—	—

Esmeralda	CBE	—	Navy	—	O	—	—	—
Ex-Cochrane	CBX	—	Navy	—	O	—	—	—
Gamero	CBG	—	Navy	—	O	—	—	—
Huasco [44]	CAH	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Imperial [44]	CAI	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Jarpa	CBJ	—	Navy	—	O	—	—	—
Limari [44]	CAL	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Lynch	CBY	—	Navy	—	O	—	—	—
Maipo CBU [130]	CBU	—	Government	—	O	—	—	—
Maipo CAB [44]	CAB	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Mapocho [44]	CAM	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
O'Brien CBN	CBN	—	Navy	—	O	—	—	—
O'Higgins	CBH	—	Navy	—	O	—	—	—
Orella	CBO	—	Navy	—	O	—	—	—
Palena [44]	CAP	250	Compania Sud-Amer. de Vapores	300, 600	P G	X	0.40	4.00
Prat	CBP	—	Navy	—	O	—	—	—
Rancagua [130]	CBW	—	Government	—	O	—	—	—
Riquelme	CBR	—	Navy	—	O	—	—	—
Serrano	CBS	—	Navy	—	O	—	—	—
Talcahuano	CBF	—	Navy	—	O	—	—	—
Thompson	CBT	—	Navy	—	O	—	—	—
Tomé	CBM	—	Navy	—	O	—	—	—
Zenteno	CBZ	—	Navy	—	O	—	—	—
CHINA								
Chao-Ho	XNW	—	Navy	—	O	—	—	—
Chu-Chien	XON	—	Navy	—	O	—	—	—
Chu-Kwan	XOG	—	Navy	—	O	—	—	—
Chu-Tai	XOA	—	Navy	—	O	—	—	—
Chu-Tung	XOD	—	Navy	—	O	—	—	—
Chu-Yew	XOY	—	Navy	—	O	—	—	—
Chu-Yu	XOU	—	Navy	—	O	—	—	—
Fei-Ying	XPS	—	Navy	—	O	—	—	—
Foo-An	XNL	—	Navy	—	O	—	—	—
Hai-Chew	XSW	—	Navy	—	O	—	—	—
Hai-Chi	XSC	—	Navy	—	O	—	—	—
Hai-Shen	XSP	—	Navy	—	O	—	—	—
Hai Yung	XSY	—	Navy	—	O	—	—	—
Kiang-Chien	XQC	—	Navy	—	O	—	—	—
Kiang-Han	XQH	—	Navy	—	O	—	—	—
Kiang-Li	XQR	—	Navy	—	O	—	—	—
Kiang-Yuen	XQU	—	Navy	—	O	—	—	—
Kien-An	XPN	—	Navy	—	O	—	—	—
Kien-Kong	XPO	—	Navy	—	O	—	—	—
Kien-Wei	XPW	—	Navy	—	O	—	—	—
King-Ching	XQW	—	Navy	—	O	—	—	—
Lien-Chin	XRC	—	Navy	—	O	—	—	—
Nan-Shen	XNS	—	Navy	—	O	—	—	—
Tung-An	XNB	—	Navy	—	O	—	—	—
Tung-Chi	XPF	—	Navy	—	O	—	—	—
Ying-Swei	XSF	—	Navy	—	O	—	—	—
Yu-Chang	XNO	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
CHINA—*contd.*							Francs.	Francs.
Yung-Chion	XNG	—	Navy	—	O	—	—	—
Yung-Fung	XNF	—	Navy	—	O	—	—	—
Yung-Kien	XNY	—	Navy	—	O	—	—	—
Yung-Tsih	XNC	—	Navy	—	O	—	—	—
CUBA								
Margarcia [76]	XC	—	Marcelino Garcia	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Olinda [76]	XA	—	Compañia Maritima Cubana (Munson S.S. Line)	—	P G	—	—	—
Paloma [76]	XB	—	Compañia Maritima Cubana (Munson S.S. Line)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
DENMARK								
2den April	OVA	—	Navy	600	O [22]	X	—	—
Absalon	OUA	—	Navy	600	O [22]	X	—	—
Aegir OVK	OVK	—	Navy	600	O [22]	X	—	—
Annam [80 91]	OZN	160	Det Ostasiatiske Co.	300, **600**	P	X	—	—
Australien OZR [80 91]	OZR	160	Det Ostasiatiske Co.	300, **600**	P	X	—	—
Beskytteren	OUM	—	Navy	600	O [22]	X	—	—
C. F. Grove [20]	OUO	100	Government	300, **600**	P G	7.30 a.m., 11.30 a.m., 1.30 p.m., 3.30 p.m., 7.30 p.m.	—[23]	—[23]
Chile OZV [80 91]	OZV	160	Det Ostasiatiske Co.	300, **600**	P	X	—	—
Columbia OZT [80 91]	OZT	160	Det Ostasiatiske Co.	300, **600**	P	X	—	—
Dannebrog [4]	OUD	—	Government	600	O [22]	X	—	—
Delfinen	OVD	—	Navy	600	O [22]	X	—	—
Dykkeren	OVY	—	Navy	600	O [22]	X	—	—
Falstria [80 91]	OZW	200	Det Ostasiatiske Co.	300, **600**	P	X	—	—
Fionia [80 91]	OZK	250	Det Ostasiatiske Co.	300, **600**	P	X	—	—
Flyvefisken	OVF	—	Navy	600	O [22]	X	—	—
Frederik VIII. [11]	OZL	200	Det Forenede Dampskibsselskab	300, **600**	P G	N	—	—
Galathea	OVG	—	Navy	600	O [22]	X	0.40	4.00
Gejser	OUG	—	Navy	600	O [22]	X	—	—
Georg Stage [24 80]	OZY	100	S.A. Georg Stages Minde	300, **600**	P	X	—	—

Havmanden	OVE	—	Navy	600	O [22]		X	—	—
H. C. Orsted [80 122]	OZX	100	Det Store Nordiske Telegrafselskab	300, 600	P ..	..	X	—	—
Hejmdal	OUJ	—	Navy	600	O [22]	..	X	—	—
Hellig Olav [11]	OZB	200	Det Forenede Dampskibsselskab ..	300, 600	P G	..	N	0.40	4.00
Herluf Trolle	OUH	—	Navy	600	O [22]	..	X	—	—
Hjaelperen	OUQ	—	Navy	600	O [22]	..	X	—	—
Hvalrossen	OVH	—	Navy	600	O [22]	..	X	—	—
Islands Falk	OUI	—	Navy	600	O [22]	..	X	—	—
Jutlandia [80 91]	OZG	250	Det Ostasiatiske Co.	300, 600	P ..	..	X	—	—
Lossen	OUL	—	Navy	600	O [22]	..	X	—	—
Lövenörn [21]	OUN	100	Government	300, 600	P G	..	7 a.m., 11 a.m., 3 p.m., 7 p.m.	— [23]	— [23]
Najaden	OVN	—	Navy	600	O [22]	..	X	—	—
Neptun	OVQ	—	Navy	600	O [22]	..	X	—	—
Nordlys [80]	OZZ	200	Dampskibsselskabet Norden (Peter Brown)	300, 600	P G	..	X	— [23]	— [23]
Nymfen..	OVC	—	Navy	600	O [22]	..	X	—	—
Olfert Fischer	OUF	—	Navy	600	O [22]	..	X	—	—
Ormen	OVO	—	Navy	600	O [22]	..	X	—	—
Oscar II. OZC [11]	OZC	200	Det Forenede Dampskibsselskab ..	300, 600	P G	..	N	0.40	4.00
Pacific OZI [80 122]	OZI	250	Det Store Nordiske Telegrafselskab	300. 600	P ..	..	X	—	—
Panama OZQ [80 91]	OZQ	200	Det Ostasiatiske Co.	300, 600	P ..	..	X	—	—
Peder Skram	OUP	—	Navy	600	O [22]	..	X	—	—
Peru OZA [80 91]	OZA	200	Det Ostasiatiske Co.	300, 600	P ..	..	X	—	—
Phönix OZO [80]	OZO	80	Dampskibsselskabet "Danmark" (Peter Brown)	600	P G	..	X	—	—
Prins Christian [80 123]	OXG	135	State Railways of Denmark ..	300, 450, 600	O ..	..	— [134]	—	—
Prinsesse Alexandrine [80 123] ..	OXH	135	State Railways of Denmark ..	300, 450, 600	O ..	..	— [134]	—	—
Ran	OVL	—	Navy	600	O [22]	..	X	—	—
Selandia [80 91]	OZF	250	Det Ostasiatiske Co.	300, 600	P ..	..	X	—	—
Siam [80 91]	OZM	160	Det Ostasiatiske Co.	300, 600	P ..	..	X	—	—
Skjold	OUS	—	Navy	600	O [22]	..	X	—	—
Söbjörnen	OVJ	—	Navy	600	O [22]	..	X	—	—
Söridderen	OVR	—	Navy	600	O [22]	..	X	—	—
Söulven..	OVU	—	Navy	600	O [22]	..	X	—	—
Spækhuggeren	OVS	—	Navy	600	O [22]	..	X	—	—
Store Nordiske [80 122]	OZJ	250	Det Store Nordiske Telegrafselskab	300, 600	P ..	..	X	—	—
Sværdfisken	OVW	—	Navy	600	O [22]	..	X	—	—
Thetis OVI	OVI	—	Navy	600	O [22]	..	X	—	—
Tongking [80 91]	OZP	160	Det Ostasiatiske Co.	300, 600	P ..	..	X	—	—
Triton OVP	OVP	—	Navy	600	O [22]	..	X	—	—
Tumleren	OVT	—	Navy	600	O [22]	..	X	—	—
United States [11]	OZD	200	Det Forenede Dampskibsselskab ..	300, 600	P G	..	N	0.40	4.00
Valkyrien OUV	OUV	—	Navy	600	O [22]	..	X	—	—
Viking OZH [80, 112]	OZH	Day, 160; night, 320	Em. Z. Svitzers Bjergnings-Entreprise	300, 600	P	..	X	—	—
Vindhunden	OVV	—	Navy	600	O [22]	..	X	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
DUTCH EAST INDIES							Francs.	Francs.
Barentsz [11]	PMI	250	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Houtman [11]	PMC	300	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Melchior Treub [11]	PMD	200	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Roggeveen [11]	PMH	150–200	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Rumphius [11]	PME	200	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
's Jacob [11]	PMG	200	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Tasman [11]	PMF	300	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Telegraaf [122]	PLA	380	Government	300, **600**, 900	O	—	—	—
Tjibodas [11]	PLL	100–200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjikembang [11]	PLH	200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjikini [11]	PLM	100–200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjilatjap [11]	PLP	150	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjileboet [11]	—	200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjiliwong [11]	PLN	100–200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjimanoek [11]	PLJ	200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjipanas [11]	PLO	150	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjisalak [11]	—	200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjisondari [11]	PLI	200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Tjitaroem [11]	PLK	200	Java, China and Japan Line ..	300, **600**	P G ..	N	0.40	4.00
Van Cloon [11]	PMA	200	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
Van Overstraten [11]	PMB	200	Koninklijke Paketvaart Maatschappij	300, **600**	P G ..	N	0.40	4.00
EGYPT								
Mahroussa [4]	SUA	350	Government	300, **600**	P	—	—	—
FRANCE								
[illegible]	FPB	160	Cie de Nav. Paquet	300, **600**	P G ..	—	0.40	—
						N	0.40	—

Afrique	FCR	Day, 270 ;	Cie Chargeurs Réunis	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	270	Société Générale de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Amazone FMA [87]	FMA	Day, 325 ; night, 650	Cie des Messageries Maritimes	300, 600	P G	6 a.m. to 10 a.m., 5 p.m. to 7 p.m., 9 p.m. to midnight	0.40	—
Amiral Aube	UCJ	350	Navy	300, 600	P G	N	0.05	—
Amiral Charner	UID	350	Navy	300, 600	P G	N	0.05	—
Amiral Jaureguiberry [25]	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Amiral Rigault de Genouilly [25]	FCG	160	Cie Chargeurs Réunis	300, 600	P G	N	0.40	—
Amiral Sallandrouze de Lamornaix [25]	FCL	160	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—
Amiral Trebouart	ULT	100	Navy	300	P G	N	0.05	—
Amiral Troude [25]	FCT	160	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—
Amiral Villaret de Joyeuse [25]	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Amiral Zédé [25]	FCZ	160	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—
Anatolie [25]	—	—	Cie de Nav. Paquet	—	—	—	—	—
Ango [25]	FCN	160	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—
Antilles [25]	—	—	Cie Gén. Transatlantique	—	—	—	—	—
Apache FYP [4]	FYP	270	H. Legru	300	P G	N	—	—
Arbalète	UDT	80	Navy	300	P G	N	0.05	—
Arc	UEA	80	Navy	300	P G	N	0.05	—
Argus	UKC	50	Navy	300	P G	N	0.05	—
Armand Béhic [87]	FMB	325	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Arquebuse	UDM	80	Navy	300	P G	N	0.05	—
Asie [87]	FCA	160	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—
Aspirant-Herber	UFZ	80	Navy	300	P G	N	0.05	—
Astrée	FZA	35	Soc. Navale Caennaise	300	P G	X	0.40	—
Atlantique [87]	FMT	Day, 270 ; night, 650	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—
Atlas ULA	ULA	50	Navy	300	P G	N	0.05	—
Atmah [4]	FYA	Day, 540 ; night, 1,350	Baron E. de Rothschild	300, 600	P G	N	—	—
Australien FMU [87]	FMU	325	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Bacchante FYB [4]	FYB	160	Henri Menier	300, 600	P G	N	—	—
Baliste	UDY	80	Navy	300	P G	N	0.05	—
Belier	UEC	80	Navy	300	P G	N	0.05	—
Bien Hoa	UJA	150	Navy	300, 600	P G	N	0.05	—
Bisson	UGK	80	Navy	300	P G	N	0.05	—
Bombarde	UEG	80	Navy	300	P G	N	0.05	—
Borda UJK	UJK	350	Navy	300, 600	P G	N	0.05	—
Bouclier	UFV	80	Navy	300	P G	N	0.05	—
Bougainville [25]	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Boutefeu	UGC	80	Navy	300	P G	N	0.05	—
Bouvines	ULB	150	Navy	300, 600	P G	N	0.05	—
Brennus	UAX	350	Navy	300, 600	P G	N	0.05	—
Britannia FJG [25]	FJG	160	Cyprien Fabre et Cie	300, 600	P G	N	0.40	—
Bruix	UIE	350	Navy	300, 600	P G	N	0.05	—
Buffle	ULD	50	Navy	300	P G	N	0.05	—
Burdigala [80]	FSU	Day, 270 ; night, 1,080	Cie de Nav. Sud-Atlantique	300, 600	P G	N	0.40	—
Calédonien [87]	FNC	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Californie [25]	FTK	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
FRANCE—*contd.*							Francs.	Francs.
Canada FJC [25]	FJC	160	Cyprien Fabre et Cie	300, **600**	P G	N	0.40	—
Capitaine Mehl	UGJ	80	Navy	300	P G	N	0.05	—
Carabine	UDR	80	Navy	300	P G	N	0.05	—
Carabinier	UFH	80	Navy	300	P G	N	0.05	—
Caravelle [25]	FTC	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Carnot	UAT	350	Navy	300, **600**	P G	N	0.05	—
Caroline FTO [25]	FTO	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Carquois	UEP	80	Navy	300	P G	N	0.05	—
Casque	UFT	80	Navy	300	P G	N	0.05	—
Cassard	UIK	150	Navy	300, **600**	P G	N	0.05	—
Cassini	UHD	150	Navy	300, **600**	P G	N	0.05	—
Catapulte	UED	80	Navy	300	P G	N	0.05	—
Caudan	ULE	50	Navy	300	P G	N	0.05	—
Cavalier	UFP	80	Navy	300	P G	N	0.05	—
Centaure	ULC	50	Navy	300	P G	N	0.05	—
Cerbère	UHB	150	Navy	300, **600**	P G	N	0.05	—
Ceylan [25]	FCC	160	Cie Chargeurs Réunis	300, **600**	P G	—	0.40	—
Champlain [25]	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Chaouïa [25]	FPC	160	Cie de Nav. Paquet	300, **600**	P G	N	0.40	—
Charlemagne	UAQ	350	Navy	300, **600**	P G	N	0.05	—
Charles Martel	UAV	350	Navy	300, **600**	P G	N	0.05	—
Charles Roux [25, 26]	FGR	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.10	—
Charlotte	FHO	Day, 160; night, 325	G. Vidor fils & Co.	300, **600**	P G	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.40	—
Chasseur	UFG	80	Navy	300	P G	N	0.05	—
Châteaurenault	UCW	350	Navy	300, **600**	P G	N	0.05	—
Chicago FTI [25]	FTI	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Chili [87]	FMC	270	Cie des Messageries Maritimes	300, **600**	P G	N	0.40	—
Cimeterre	UGA	80	Navy	300	P G	N	0.05	—
Claymore	UEJ	80	Navy	300	P G	N	0.05	—
Cognée	UFA	80	Navy	300	P G	N	0.05	—
Commandant Bory	UGD	80	Navy	300	P G	N	0.05	—
Commandant Lucas	UGP	80	Navy	300	P G	N	0.05	—
Commandant Rivière	UGE	80	Navy	300	P G	N	0.05	—
Condé	UCK	350	Navy	300, **600**	P G	N	0.05	—
Condorcet	UAG	350	Navy	300, **600**	P G	N	0.05	—
Cordillère [87]	FMR	300	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
[illegible]	FRC	160	Cie Marseillaise de Nav. à Vapeur	300, **600**	P G	N	0.10	—
						—	0.10	

Cyclope	ULI	50	Navy	300	P G	N	0.05	—
Danton	UAB	350	Navy	300, 600	P G	N	0.05	—
Dard	UDX	80	Navy	300	P G	N	0.05	—
Décidée	UIZ	200	Navy	300, 600	P G	N	0.05	—
Dehorter	UGH	80	Navy	300	P G	N	0.05	—
Démocratie	UAK	350	Navy	300, 600	P G	N	0.05	—
d'Entrecasteaux	UIG	350	Navy	300, 600	P G	N	0.05	—
Desaix	UCR	350	Navy	300, 600	P G	N	0.05	—
Descartes	UIH	150	Navy	300, 600	P G	N	0.05	—
d'Estrées	UIO	150	Navy	300, 600	P G	N	0.05	—
d'Iberville	UIS	200	Navy	300, 600	P G	N	0.05	—
Diderot	UAE	350	Navy	300, 600	P G	N	0.05	—
Divona [80]	FSD	Day, 270; night, 1,080	Cie de Nav. Sud-Atlantique	300, 600	P G	N	0.40	—
Djemnah [87]	FMD	350	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Doudart de Lagrée	UKD	50	Navy	300	P G	N	0.05	—
Doukkala [25]	FPD	160	Cie de Nav. Paquet	300, 600	P G	—	0.40	—
Drôme [130]	UJE	150	Government	300, 600	P G	N	0.05	—
Duc d'Aumale [25] [28]	FGD	160	Cie Gén. Transatlantique	300, 600	P G	N	0.10	—
Duc de Bragance [25] [29]	FGG	160	Cie Gén. Transatlantique	300, 600	P G	N	0.10	—
du Chayla	UIJ	150	Navy	300, 600	P G	N	0.05	—
Duguay Trouin	UJC	350	Navy	300, 600	P G	N	0.05	—
Dumbea [87]	FND	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Dunois	UIT	80	Navy	300	P G	N	0.05	—
Dupetit Thouars	UCN	350	Navy	300, 600	P G	N	0.05	—
Dupleix —[25]	—	—	Cie Chargeurs Réunis	—	—	—	—	—
Dupleix UCS	UCS	350	Navy	300, 600	P G	N	0.05	—
Durandal	UDA	80	Navy	300	P G	N	0.05	—
Edgar Quinet	UCB	350	Navy	300, 600	P G	N	0.05	—
Edouard Jeramec [122]	FZJ	—	Cie Francaise des Cables Télégraphiques	300, 600	P	X	0.40	—
El Kantara [87]	FNK	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Elisabeth Marie	FHB	160	Soc. Nouv. des Pêcheries à vap.	300, 600	P G	X	0.40	—
Emma	FHE	Day, 160; night, 325	G. Vidor fils & Co.	300, 600	P G	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.40	—
Enseigne Henry	UFX	80	Navy	300	P G	N	0.05	—
Epée	UDG	80	Navy	300	P G	N	0.05	—
Epieu	UDW	80	Navy	300	P G	N	0.05	—
Equateur [87]	FME	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Ernest Renan	UCD	350	Navy	300, 600	P G	N	0.05	—
Ernest Simons [87]	FMS	325	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Eros [4]	FYS	160	Henri de Rothschild	300	P G	N	—	—
Escopette	UDJ	80	Navy	300	P G	N	0.05	—
Espagne FAE [80]	FAE	160	Cie de Nav. France-Amerique	300	P G	N	0.40	—
Espagne FTE [25]	FTE	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Estafette	ULM	50	Navy	300	P G	N	0.05	—
Etendard	UFD	80	Navy	300	P G	N	0.05	—
Eugène Péreire [25] [29]	FGP	160	Cie Gén. Transatlantique	300	P G	N	0.10	—
Europe [87]	FCU	Day, 270; night, 1,080	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
FRANCE—*contd.*							Francs.	Francs.
Fanfare	UEZ	80	Navy	300	P G	N	0.05	—
Fanion	UFE	80	Navy	300	P G	N	0.05	—
Fantassin	UFO	80	Navy	300	P G	N	0.05	—
Fauconneau	UDC	80	Navy	300	P G	N	0.05	—
Faulx	UGB	80	Navy	300	P G	N	0.05	—
Flamberge	UDL	80	Navy	300	P G	N	0.05	—
Flandre [25]	FGF	160	Cie Gén. Transatlantique	300, **600**	P G	—	0.40	—
Fleuret	UER	80	Navy	300	P G	N	0.05	—
Forbin	UIP	150	Navy	300, **600**	P G	N	0.05	—
Formosa FVO [80]	FVO	270	Soc. Gén. de Transports Maritimes à Vapeur	300, **600**	P G	N	0.40	—
Foudre	UIM	350	Navy	300, **600**	P G	N	0.05	—
Fourche	UFW	80	Navy	300	P G	N	0.05	—
France FHF [91]	FHF	400	Soc. des Navires Mixte	300, **600**, 1,800	P G	X	0.40	—
France FTZ [25]	FTZ	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
France UBA	UBA	350	Navy	300, **600**	P G	N	0.05	—
Francis Garnier	UGI	80	Navy	300	P G	N	0.05	—
Francisque	UEH	80	Navy	300	P G	N	0.05	—
Friant	UIL	150	Navy	300, **600**	P G	N	0.05	—
Fronde	UDQ	80	Navy	300	P G	N	0.05	—
Furieux	ULF	150	Navy	300, **600**	P G	N	0.05	—
Gabion	UEX	80	Navy	300	P G	N	0.05	—
Gange [87]	FMG	300	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
Garonna [80]	FSG	Day, 270; night, 1,080	Cie de Nav. Sud-Atlantique	300, **600**	P G	N	0.40	—
Garonne	UJH	150	Navy	300, **600**	P G	N	0.05	—
Glaive	UFI	80	Navy	300	P G	N	0.05	—
Gloire	UCL	350	Navy	300, **600**	P G	N	0.05	—
Goliath ULG	ULG	50	Navy	300	P G	N	0.05	—
Golo [25] [27]	FRO	160	Cie Marseillaise de Nav. à Vapeur	300, **600**	P G	N	0.10	—
Gueydon	UCP	350	Navy	300, **600**	P G	N	0.05	—
Guichen	UCV	350	Navy	300, **600**	P G	N	0.05	—
Hache	UFB	80	Navy	300	P G	N	0.05	—
Haiti [25]	FGH	160	Cie. Gén. Transatlantique	300, **600**	P G	—	0.40	—
Hallebarde	UDB	80	Navy	300	P G	N	0.05	—
Henri IV.	[illegible]	[illegible]	[illegible]	300	P G	N	0.05	—

Henriette	FHH	Day, 160;	G. Vidor fils & Co.	300, 600	P G	7 a.m. to 10 a.m., 7 p.m. to 11 p.m.	0.40	—
Hudson [25]	FTH	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Hussard	UFQ	80	Navy	300	P G	N	0.05	—
Iberia [25 27]	FRB	160	Cie Marseillaise de Nav. à Vapeur	300, 600	P G	—	0.10	—
Ibis	UKA	50	Navy	300	P G	N	0.05	—
Infatigable	ULP	50	Navy	300	P G	N	0.05	—
Ionie [25]	FPO	160	Cie de Nav. Paquet	300, 600	P G	—	0.40	—
Italia [25]	—	—	Cie Marseillaise de Nav. à Vapeur	—	—	—	—	—
Italie [80]	FAI	270	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Janissaire	UFS	80	Navy	300	P G	N	0.05	—
Jauréguiberry	UAW	350	Navy	300, 600	P G	N	0.05	—
Javeline	UDV	80	Navy	300	P G	N	0.05	—
Jean-Bart	UAY	150	Navy	300, 600	P G	N	0.05	—
Jeanne	FHG	Day, 160; night, 325	G. Vidor fils & Co.	300, 600	P G	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.40	—
Jeanne Blanche	ULN	50	Navy	300	P G	N	0.05	—
Jeanne d'Arc	UCT	350	Navy	300, 600	P G	N	0.05	—
Jeannette	FHJ	Day, 160; night, 380	Soc. Nouvelle des Pêcheries à Vapeur.	300, 600	P G	8 a.m. to 10 a.m., midday to 2 p.m., 8 p.m. to 10 p.m.	0.40	—
Jules Ferry	UCH	350	Navy	300, 600	P G	N	0.05	—
Jules Michelet	UCE	350	Navy	300, 600	P G	N	0.05	—
Jurien de la Gravière	UCX	350	Navy	300, 600	P G	N	0.05	—
Justice	UAI	350	Navy	300, 600	P G	N	0.05	—
Karnak FMK [87]	FMK	325	Cie des Messageries Maritimes	300, 600	P G	N	0.40	—
Kersaint	UIW	200	Navy	300, 600	P G	N	0.05	—
Kléber	UCQ	350	Navy	300, 600	P G	N	0.05	—
La Bretagne [80]	FSB	Day, 270; night, 1,080	Cie de Nav. Sud-Atlantique	300, 600	P G	N	0.40	—
La Gascogne [80]	FSC	Day, 270; night, 1,080	Cie de Nav. Sud-Atlantique	300, 600	P G	N	0.40	—
La Hire	UIV	80	Navy	300	P G	N	0.05	—
La Loire [80]	FHL	260	Cie Nantaise de Nav. à Vapeur	300, 600	P G	—	0.40	—
La Lorraine [25]	FTL	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
La Marsa [25 28]	FXR	160	Cie de Nav. Mixte	300, 600	P G	N	0.10	—
La Navarre [25]	FTN	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Lansquenet	UFN	80	Navy	300	P G	N	0.05	—
La Rosita	FHY	250	Victor Fourny	300, 600	P G	8 a.m. to 10 a.m., 2 p.m. to 4 p.m.	0.40	—
La Savoie [25]	FTS	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Latouche-Treville	UIC	350	Navy	300, 600	P G	N	0.05	—
La Touraine [25]	FTT	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Lavoisier	UIN	150	Navy	300, 600	P G	N	0.05	—
Le Nord [39 80]	FZN	Day, 190; night, 380	Cie des Chemins de Fer du Nord	300, 600	P G	N	0.15	—
Le Pas de Calais [38 80]	FZP	Day, 190; night, 380	Cie des Chemins de Fer du Nord	300, 600	P G	N	0.15	—
Liamone [25 27]	FRA	160	Cie Marseillaise de Nav. à Vapeur	300, 600	P G	—	0.10	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
FRANCE—*contd.*							Francs.	Francs.
Liger [80]	FSL	Day, 270; night, 1,080	Cie de Nav. Sud-Atlantique	300, **600**	P G	N	0.40	—
Loiret	UJD	150	Navy	300, **600**	P G	N	0.05	—
Lotus [87]	FML	270	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
Louqsor [87]	FNL	300	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
Madonna [25]	FJM	160	Cyprien Fabre et Cie	300, **600**	P G	N	0.40	—
Magon	UGN	80	Navy	300	P G	N	0.05	—
Malte [25]	FCM	160	Cie Chargeurs Réunis	300, **600**	P G	N	0.40	—
Mameluck	UFR	80	Navy	300	P G	N	0.05	—
Mangini	UGO	80	Navy	300	P G	N	0.05	—
Manouba [25] [29]	FXB	160	Cie de Nav. Mixte	300, **600**	P G	N	0.10	—
Marceau	ULQ	50	Navy	300, **600**	P G	N	0.05	—
Maréchal Bugeaud [25] [28]	FGY	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.10	—
Marguerite Marie	FHM	160	Joly, Duhamel & Vasse	300	P G	9 a.m. to midday, 7 p.m. to 11 p.m.	0.40	—
Marie-Rose	FHI	Day, 160; night, 325	G. Vidor fils & Co.	300, **600**	P G	7 a.m. to 10 a.m., 2 p.m. to 4 p.m., 7 p.m. to 11 p.m.	0.40	—
Maroc	FHK	200	Joseph Huret	300, **600**	P G	X	0.40	—
Marseillaise	UCM	350	Navy	300, **600**	P G	N	0.05	—
Martinique [25]	FTM	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Masséna	UAO	350	Navy	300, **600**	P G	N	0.05	—
Massue	UFC	80	Navy	300	P G	N	0.05	—
Medie [25]	FPM	160	Cie de Nav. Paquet	300, **600**	P G	—	0.40	—
Medjerda [25] [28]	FXJ	160	Cie de Nav. Mixte	300, **600**	P G	N	0.10	—
Méhari	ULV	50	Navy	300	P G	N	0.05	—
Melbourne FNM [87]	FNM	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Mexico FTX [25]	FTX	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Mingrelie [25]	—	—	Cie de Nav. Paquet	—	—	—	—	—
Mirabeau	UAC	350	Navy	300, **600**	P G	N	0.05	—
Moïna [4]	FYM	100	Waché de Roo	300, **600**	P G	X	0.40	—
Moïse [25] [29]	FGS	160	Cie Gén. Transatlantique	300, **600**	P G	—	0.10	—
Montcalm UCO	UCO	350	Navy	300, **600**	P G	N	0.05	—
Montreal FTJ [25]	FTJ	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Mortier	UEO	80	Navy	300	P G	N	0.05	—
Mousqueton	UDZ	80	Navy	300	P G	N	0.05	—
Natal FMN [87]	FMN	300	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
Niagara FTB [25]	[illegible]	[illegible]	[illegible]	300, **600**	P G	—	0.40	—
Notre Dame de la Mer [87]	FZM	350	[illegible]	[illegible]	P G	—	0.40	—

Numidia [25] [27]	[illegible]	[illegible]	[illegible]					
Oceanien [87]	FNO	320	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Oriflamme	UEV	80	Navy	300	P G	N	0.05	—
Ouessant [25]	FCW	160	Cie Chargeurs Réunis	300, 600	P G	—	0.40	—
Oxus [87]	FMQ	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Pacifique [87]	FNW	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Pampa FVP [80]	FVP	270	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Parana FVN [80]	FVN	270	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Patria FJP [41]	FJP	160	Cyprien Fabre et Cie	300, 600	P G	N	0.40	—
Patrie	UAL	350	Navy	300, 600	P G	N	0.05	—
Paul Lecat [87]	FNP	400	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Pérou [25]	FTP	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Pertuisane	UDI	80	Navy	300	P G	N	0.05	—
Phrygié [25]	FPJ	160	Cie de Nav. Paquet	300, 600	P G	—	0.40	—
Pierrier	UEN	80	Navy	300	P G	N	0.05	—
Pique	UDE	80	Navy	300	P G	N	0.05	—
Pistolet	UEB	80	Navy	300	P G	N	0.05	—
Plata FVL [80]	FVL	270	Soc. Gén. de Transports Maritimes à Vapeur	300, 600	P G	N	0.40	—
Pluton	UHA	150	Navy	300, 600	P G	N	0.05	—
Poignard	UFJ	80	Navy	300	P G	N	0.05	—
Polynesien [87]	FNQ	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
Pothuau	UIB	150	Navy	300, 600	P G	N	0.05	—
Protet	UGM	80	Navy	300	P G	N	0.05	—
Provence FAP [80]	FAP	160	Cie de Nav. France-Amerique	300	P G	N	0.40	—
Puerto Rico [25]	FGU	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Québec [25]	FTQ	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Rapière	UDK	80	Navy	300	P G	N	0.05	—
République	UAM	350	Navy	300, 600	P G	N	0.05	—
Requin	ULR	150	Navy	300, 600	P G	N	0.05	—
Résolue [4]	FYR	215	Pierre Lebaudy	300	P G	N	—	—
Rhône	UJG	150	Navy	300, 600	P G	N	0.05	—
Rochambeau [25]	FTR	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
Roma FJR [25]	FJR	160	Cyprien Fabre et Cie	300, 600	P G	N	0.40	—
Rosemonde	FHD	120	Victor Fourny	300, 600	P G	8 a.m. to 10 a.m. 2 p.m. to 4 p.m.	0.40	—
Rouen [88]	FZR	160	State Railway Administration	300, 600	P G	X	0.15	—
Sabre	UEI	80	Navy	300	P G	N	0.05	—
Sabretache	UET	80	Navy	300	P G	N	0.05	—
Sacha	FHC	160	Soc. Nouvelle des Pêcheries à Vapeur	300	P G	6 a.m. to 9 a.m., 4 p.m. to 7 p.m.	0.40	—
Sagaïe	UDO	80	Navy	300	P G	N	0.05	—
Saghalien [87]	FNS	300	Cie des Messageries Maritimes	300, 600	P G	—	0.40	—
St. Domingue [25]	—	—	Cie Gén. Transatlantique	—	—	—	—	—
St. Laurent [25]	FTY	160	Cie Gén. Transatlantique	300, 600	P G	N	0.40	—
St. Louis UAS	UAS	350	Navy	300, 600	P G	N	0.05	—
St. Michel	FAM	180	Soc. Navale de l'Ouest	300, 600	P G	X	0.40	—
Sainte Jehanne [87]	FZS	300	Soc. des Œuvres de Mer	300, 600	P G	X	0.40	—
Samara [80]	FSM	300	Cie de Nav. Sud-Atlantique	300, 600	P G	—	0.40	—
Samson ULH	ULH	50	Navy	300	P G	N	0.05	—

Ship Stations—*Continued*

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FRANCE—*contd.*							Francs.	Francs.
Sant Anna [25]	FJS	160	Cyprien Fabre et Cie	300, **600**	P G	N	0.40	—
Sape	UEW	80	Navy	**300**	P G	N	0.05	—
Sarbacane	UDS	80	Navy	**300**	P G	N	0.05	—
Sentinelle	ULK	50	Navy	**300**	P G	N	0.05	—
Sequana [80]	FSQ	Day, 200; night, 600	Cie de Nav. Sud-Atlantique	300, **600**	P G	—	0.40	—
Sidi-Brahim [26 80]	FVB	160	Soc. Gén. de Transports Maritimes à Vapeur	300, **600**	P G	N	0.10	—
Sontay [87]	FMX	300	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
Spahi	UFK	80	Navy	**300**	P G	N	0.05	—
Stylet	UEK	80	Navy	**300**	P G	N	0.05	—
Surcouf	UIQ	150	Navy	300, **600**	P G	N	0.05	—
Sussex [88]	FZX	160	State Railway Administration	300, **600**	P G	X	0.15	—
Sydney FNY [87]	FNY	300	Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—
Taillebourg	ULJ	50	Navy	**300**	P G	N	0.05	—
Théodore Mante [25 29]	FXM	160	Cie de Nav. Mixte	300, **600**	P G	N	0.10	—
Timgad [25 29]	FGO	160	Cie Gén. Transatlantique	**300**	P G	N	0.10	—
Tirailleur	UFM	80	Navy	**300**	P G	N	0.05	—
Trident	UEQ	80	Navy	**300**	P G	N	0.05	—
Tromblon	UEL	80	Navy	**300**	P G	N	0.05	—
Vaucluse [130]	ULO	80	Government	**300**	P G	N	0.05	—
Venezia FJV [25]	FJV	160	Cyprien Fabre et Cie	300, **600**	P G	N	0.40	—
Venezuela FTW [25]	FTW	325	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Vergniaud	UAH	350	Navy	300, **600**	P G	N	0.05	—
Vérité	UAJ	350	Navy	300, **600**	P G	N	0.05	—
Victor Hugo	UCG	350	Navy	300, **600**	P G	N	0.05	—
Vigilante	UKB	50	Navy	**300**	P G	N	0.05	—
Ville d'Alger [25 29]	FGQ	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.10	—
Ville de Madrid [25 26]	FGM	160	Cie Gén. Transatlantique	300, **600**	P G	—	0.10	—
Ville de Tunis [25]	FGT	160	Cie Gén. Transatlantique	300, **600**	P G	—	—	—
Vinh Long [130]	UJB	150	Government	300, **600**	P G	N	0.05	—
Virginie [25]	FTV	160	Cie Gén. Transatlantique	300, **600**	P G	N	0.40	—
Voltaire UAD	UAD	350	Navy	300, **600**	P G	N	0.05	—
Voltigeur	UFL	80	Navy	**300**	P G	N	0.05	—
Waldeck-Rousseau	UCA	350	Navy	300, **600**	P G	N	0.05	—
Yatagan	[illegible]		Cie des Messageries Maritimes	300, **600**	P G	—	0.40	—

[illegible]	DAY	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Adeline-Hugo Stinnes III [80]	DAH	200	Hugo Stinnes	300, 600	P G	X	0.40 [33]	4.00 [32]
Adler [80]	DAD	100	D.S. Ges. Argo	300, 600	P G	8 a.m. to 1 p.m., 3 p.m. to 6 p.m., 8 p.m. to midnight	0.40 [32]	4.00 [32]
Adolf [80]	DAO	60	Geestemünder Herings und Hochseefischerie-Aktienges	300, 600	P G	X	0.40	4.00
Adolf Woermann [31]	DAW	325	Woermann Line	300, 600	P G	9.30 a.m. to 5.30 p.m. 9.30 p.m. to 1.30 a.m.	0.40	4.00
Aegir AAE	AAE	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Albatross AAK	AAK	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Albingia [31]	DAB	200	Hamburg-Amerika Line (Atlas Line)	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.25 [39]	2.50 [39]
Alda [80]	DAJ	325	Roland Line	300, 600	P G	X	0.40	4.00
Alexandra Woermann [43]	DXW	325	Woermann Line	300, 600	P G	X	0.40	4.00
Allemannia [31]	DAM	200	Hamburg-Amerika Line (Atlas Line)	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.25 [39]	2.50 [39]
Alrich [80]	DAQ	325	Roland Line	300, 600	P G	X	0.40	4.00
Amasis [43]	DYV	200	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Amazone AAM	AAM	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Amerika [31]	DDR	250	Hamburg-Amerika Line	300, 600	P G	N	0.40	4.00
Andalusia [31]	DQE	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Andree Rickmers [43]	DND	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Anhalt [31]	DLT	200	Norddeutscher-Lloyd	300, 600	P G	X	0.40	4.00
Annie-Hugo Stinnes VI [80]	DAI	200	Hugo Stinnes	300, 600	P G	X	0.40 [32]	4.00 [32]
Antonina [31]	DAN	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Arcadia DXC [31]	DXC	200	Hamburg Amerika Line	300, 600	P G	N	0.40	4.00
Arcona	AAR	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Arensburg [80]	DAG	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Armenia [31]	DXM	200	Hamburg-Amerika Line	300, 600	P G	N	0.40	4.00
Arsterturm [80]	DUA	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Artemisia [31]	DTQ	100	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Asuncion DAC [31]	DAC	200	Hamburg Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Atto [80]	DAT	325	Roland Line	300, 600	P G	X	0.40	4.00
Augsburg	AAX	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Badenia [31]	DBX	200	Hamburg Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Bahia DBP [31]	DBP	325	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Bahia Blanca [31]	DBB	200	Hamburg-Süd. Am. D.S. Ges	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Bahia Castillo [31]	DBK	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Bahia Laura [31]	DBL	200	Hamburg-Süd Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00

Ship Stations—*Continued*

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GERMANY—*contd.*							Francs.	Francs.
Barbarossa [31]	DKS	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Batavia [31]	DDJ	250	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Bavaria [31]	DBV	200	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Belgrano DBN [31]	DBN	325	Hamburg-Süd. Am. D.S. Ges.	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Belgravia [31]	DEL	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Beowulf	ABW	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Berengar [80]	DBE	325	Roland Line	300, **600**	P G	X	0.40	4.00
Berlin ABE	ABE	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Berlin DKB [31]	DKB	250	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Bermuda [31]	DQG	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Berthold [80]	DBD	60	Geestemünder Herings und Hochseefischerie-Aktienges.	300, **600**	P G	6 a.m. to 7 a.m., 6 p.m. to 7 p.m.	0.40	4.00
Blitz	ABZ	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Blücher [31]	DDB	250	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Bochum [80]	DOM	325	Deutsch-Australische D.S. Ges	300, **600**	P G	X	0.40	4.00
Bohemia DBJ [31]	DBJ	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Bosnia [31]	DBZ	200	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Brandenburg ABD	ABD	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Brandenburg DBG [31]	DBG	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Brasilia [31]	DQI	100	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Braunschweig	ABG	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Bremen ABN	ABN	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Bremen DBR [31]	DBR	325	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Breslau [31]	DBU	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Brisgavia [31]	DBQ	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Bubendey [31]	DEY	200	Hamburg-Amerika Line	300, **600**	P G	N	0.12	—
Buenos Aires DBS [31]	DBS	200	Hamburg-Süd. Am. D.S. Ges.	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Bulgaria [31]	DDG	250	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Bürgermeister [31]	DBM	325	Deutsche Ost-Afrika Line	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Camilla Rickmers [43]	DLR	200	Rickmers, Reismühlen, Reederei und Schiffbau, A.G.	300, **600**	P G	X	0.40	4.00
Cap Arcona [31]	DCA	325	Hamburg Süd. Am. D.S. Ges.	300, **600**	P G	N	0.40	4.00
Cap Blanco [31]	DCB	325	Hamburg Süd. Am. D.S. Ges.	300, **600**	P G	N	0.40	4.00
Cap Ortegal [31]	DC[illegible]	325	Hamburg Süd. Am. D.S. Ges.	300, **600**	P G	N	0.40	4.00
[illegible]						N	0.40	4.00

Cap Roca [31]	DCR	200	Hamburg-Süd. Am. D.S. Ges.	[illegible]	[illegible]		[illegible]	[illegible]	[illegible]
Cap Verde [31]	DCE	200	Hamburg Süd. Am. D.S. Ges. ..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Cap Vilano [31]	DCV	250	Hamburg-Süd. Am. D.S. Ges. ..	300, 600	P G	..	N	0.40	4.00
Carmen	ACR	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Cassel [31]	DCC	200	Norddeutscher-Lloyd	300, 600	P G	..	N	0.40	4.00
Chemnitz [31]	DCZ	200	Norddeutscher-Lloyd	300, 600	P G	..	N	0.40	4.00
Cincinnati DDC [31]	DDC	250	Hamburg-Amerika Line	300, 600	P G	..	N	0.40	4.00
Clara Blumenfeld [80]	DCL	200	Bd. Blumenfeld	300, 600	P G	..	X	0.40[32]	4.00[32]
Cläre-Hugo Stinnes I.[80] ..	DCS	200	Hugo Stinnes	300, 600	P G	..	X	0.40	4.00
Cleveland DDV [31]	DDV	250	Hamburg-Amerika Line	300, 600	P G	..	N	0.40	4.00
Cobra [31]	DCD	60	Hamburg-Amerika Line	300, 600	P G	..	N	0.12	—
Coburg [31]	DCG	200	Norddeutscher-Lloyd	300, 600	P G	..	N	0.40	4.00
Condor	ACN	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Corcovado DRC[31]	DRC	250	Hamburg-Amerika Line	300, 600	P G	..	N	0.40	4.00
Cordoba DCK [31]	DCK	200	Hamburg-Süd. Am. D.S. Ges. ..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Corrientes DOY [31]	DOY	200	Hamburg-Süd.-Am. D.S. Ges. ..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Crefeld [31]	DCT	200	Norddeutscher-Lloyd	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Crostafels [80]	DOT	200	D.S. Ges. Hansa	300, 600	P G	..	X	0.40	4.00
Dania [31]	DDX	200	Hamburg-Amerika Line	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Danzig	ADZ	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Deike Rickmers [43]	DIK	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	..	X	0.40	4.00
Delphin ADC	ADC	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Derfflinger ADF	ADF	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Desterro [31]	DET	200	Hamburg-Süd. Am. D.S. Ges. ..	300, 600	P G	..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Deutschland ADE	ADE	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Deutschland DDU [36] [80] ..	DDU	110	Prussian Railway Administration	300, 375, 600	O[34]	P R[35]	X	0.18[37]	1.80[37]
Diedrich [80]	DTD	60	Geestemünder Herings- und Hochseefischerei-Aktienges.	300, 600	P G	..	6 a.m. to 7 a.m., 6 p.m. to 7 p.m.	0.40	4.00
Dora-Hugo Stinnes XII.[80] ..	DOS	200	Hugo Stinnes	300, 600	P G	..	X	0.40	4.00
Dorothea Rickmers [43]	DDY	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	..	X	0.40	4.00
Drache	ADA	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Drachenfels [80]	DCH	100	D.S. Ges. Hansa	300, 600	P G	..	X	0.40	4.00
Düsseldorf [80]	DSU	325	Deutsche-Australische D.S. Ges.	300, 600	P G	..	X	0.40	4.00
Eber	AEB	—	Navy	300, 600	O ..	..	N	0.40[33]	4.00[33]
Ebernburg [80]	DEG	200	D.S. Ges. Hansa	300, 600	P G	..	X	0.40	4.00
Edmund-Hugo Stinnes IV.[80] ..	DEH	200	Hugo Stinnes	300, 600	P G	..	X	0.40[32]	4.00[32]
Edward [80]	DED	60	Geestemünder Herings- und Hochseefischerei-Aktienges.	300, 600	P G	..	X	0.40	4.00
Ehrenfels [80]	DEV	200	D.S. Ges. Hansa	300, 600	P G	..	X	0.40	4.00
Eisenach [31]	DEI	200	Norddeutscher-Lloyd	300, 600	P G	..	N	0.40	4.00
Elisabeth Rickmers [43] ..	DRX	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	..	X	0.40	4.00
Elkab [31]	DEB	325	D.S. Ges. Kosmos	300, 600	P G	..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GERMANY—*contd.*							Francs.	Francs.
Ellen Rickmers [43]	DEX	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, **600**	P G	X	0.40	4.00
Elsass AEL	AEL	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Elsass DEC [31]	DEC	200	Norddeutscher-Lloyd	300, **600**	P G	X	0.40	4.00
Emden [31]	DQL	100	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Erlangen [31]	DEN	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Ernst-Hugo Stinnes XI. [80]	DES	200	Hugo Stinnes	300, **600**	P G	X	0.40	4.00
Esslingen [80]	DEE	325	Deutsch-Australische D.S. Ges.	300, **600**	P G	X	0.40	4.00
Fangturm [80]	DFA	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Frankenwald [31]	DFD	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Frankfurt [31]	DFT	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Freiberg [80]	DFG	325	Deutsch-Australische D.S. Ges.	300, **600**	P G	X	0.40	4.00
Fremantle [80]	DFE	325	Deutsch-Australische D.S Ges.	300, **600**	P G	X	0.40	4.00
Freya	AFR	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Friedrich der Grosse AFU	AFU	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Friedrich der Grosse DKD [31]	DKD	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Friesenberg [80]	DBO	200	Hermann Kimme	300, **600**	P G	X	0.40	4.00
Frithjof AFT	AFT	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Fritz-Hugo Stinnes V. [80]	DFH	200	Hugo Stinnes	300, **600**	P G	X	0.40[32]	4.00[32]
Frosch IV. [4, 80]	DZY	50	Dr. Gunther Falckenberg	200, 300, **600**	P	X	—	—
Fuchs	AFV	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Fürst Bismarck ABI	ABI	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Fürst Bismarck DFB [31]	DFB	325	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Fürst Bulow [31]	DQM	100	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Ganelon [80]	DGA	325	Roland Line	300, **600**	P G	X	0.40	4.00
Gazelle	AGL	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
Gefion	AGF	—	Navy	300, **600**	O	N	0.40[33]	4.00[33]
General [31]	DGL	325	Deutsche Ost-Afrika Line	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
George Washington DKN [31]	DKN	250	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Gernis [80]	DGQ	325	Roland Line	300, **600**	P G	X	0.40	4.00
Gertrud Woermann [31]	DGW	325	Woermann Line	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to [illegible]	0.40	4.00

Gneisenau	DGU	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Goeben DGN [31]	DGN	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Goldenfels [80]	DGF	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Gotha [31]	DGT	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Gouverneur Jaeschke [31]	DGJ	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 p.m.	0.40	4.00
Graf Waldersee [31]	DDW	200	Hamburg-Amerika Line	300, 600	P G	N	0.40	4.00
Granada [31]	DQN	100	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Graudenz	AGR	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Greiffenfels [80]	DGE	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Grete-Hugo Stinnes VIII. [80]	DGH	200	Hugo Stinnes	300, 600	P G	X	0.40 [32]	4.00 [32]
Grille	AGS	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Grosser Kürfurst AKZ	AKZ	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Grosser Kürfurst DKG [31]	DKG	250	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Grossherzog Friedrich August [24 80]	DGG	200	Deutscher Schulschiffverein	300, 600	P G	X	0.40	4.00
Grossherzog von Oldenburg [80 122]	DGO	200	Norddeutsche Seekabelwerke Coy.	300, 600	— [38]	X	—	—
Grunewald [31]	DGR	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Habsburg, DHG [31]	DHG	250	Hamburg-Amerika Line	300, 600	P G	N	0.40	4.00
Hagen AHA	AHA	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Haimon [80]	DHA	325	Roland Line	300, 600	P G	X	0.40	4.00
Hamburg AHM	AHM	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Hamburg DDH [31]	DDH	250	Hamburg-Amerika Line	300, 600	P G	N	0.40	4.00
Hannover AHV	AHV	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Hannover DHV [31]	DHV	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Hansa AHN	AHN	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Hansa DZH [31]	DZH	100	Hamburg-Amerika Line	300, 600	P G	X	0.40	4.00
Harzburg [80]	DZG	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Hathor [43]	DHC	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Hay	AHP	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Heimdall AHD	AHD	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Heinrich-Hugo Stinnes VII. [80]	DHH	200	Hugo Stinnes	300, 600	P G	X	0.40 [32]	4.00 [32]
Helene Blumenfeld [80]	DHB	200	Bd. Blumenfeld	300, 600	P G	X	0.40 [32]	4.00 [32]
Helene-Hugo Stinnes XIV. [80]	DHU	200	Hugo Stinnes	300, 600	P G	X	0.40	4.00
Helgoland AHC	AHC	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Helios DHS [43]	DHS	200	Deutsch-Amerikanische Petroleum-Ges.	300, 600	P G	X	0.40	4.00
Heluan [31]	DHE	325	D.S. Ges. Kosmos	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Henny Woermann [31]	DHW	325	Woermann Line	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m to 1.30 a.m.	0.40	4.00
Hera [43]	DHK	200	Deutsch-Amerikanische Petroleum-Ges.	300, 600	P G	X	0.40	4.00
Hertha	AHT	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Herzogin Cecilie [24 43]	DHZ	200	Norddeutscher-Lloyd	300, 600	P G	X	0.40	4.00
Hessen	AHE	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Hildebrand AHI	AHI	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Hilde-Hugo Stinnes X. [80]	DHI	200	Hugo Stinnes	300, 600	P G	X	0.40 [32]	4.00 [32]
Hohenfels [80]	DHM	100	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GERMANY—*contd.*							Francs.	Francs.
Hohenstaufen [31]	DHN	250	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Hohenzollern [4]	AHO	—	Government	300, **600**	O	N	0.40 [33]	4.00 [33]
Holger [80]	DHR	325	Roland Line	300, **600**	P G	X	0.40	4.00
Holsatia [31]	DZE	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Holstein [80]	DHL	325	Norddeutscher Lloyd	300, **600**	P G	X	0.40	4.00
Huberfels [80]	DHD	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Imkenturm [80]	DIM	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Imperator DIR [31]	DIR	100	Stettiner D.S. Ges. J. F. Braeunlich G. m. b. H.	300, **600**	P G	— [40]	0.18	1.80
Imperator DIT [31]	DIT	325	Hamburg-Amerika Line	300, **600**, 1,800	P G	N	0.40	4.00
Irene	AIR	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Irmingard [80]	DID	200	Midgard. Deutsche Seeverkehrs-Aktienges.	300, **600**	P G	X	0.40	4.00
Italia DIL [43]	DIL	200	W. Kunstmann	300, **600**	P G	10 a.m. to 11 a.m., 3 p.m. to 4 p.m., 7 p.m. to 8 p.m.	0.40	4.00
Jade [97]	AIA	80	Imperial Ministry of Marine	300, **600**	O	X	0.40 [33]	4.00 [33]
Java [80]	DJV	325	Deutsch-Australische D.S. Ges.	300, **600**	P G	X	0.40	4.00
Kaiser AKS	AKS	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiser DKQ [31]	DKQ	60	Hamburg-Amerika Line	300, **600**	P G	N	0.12	—
Kaiser Barbarossa	AKB	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiser Friedrich III.	AKF	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiserin	AKT	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiserin Augusta	AKA	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiserin Auguste Victoria [31]	DDA	250	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Kaiser Karl der Grosse	AKG	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiser Wilhelm II. AKI	AKI	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kaiser Wilhelm II. DKM [31]	DKM	325	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Kaiser Wilhelm der Grosse,	AKW	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Kandelfels [80]	DKU	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Karnak DNK [43]	DNK	325	D.S. Ges. Kosmos	300, **600**	P G	X	0.40	4.00
Kigoma [31]	DYT	325	Deutsche Ost-Afrika Line	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Kleist [31]	DST	325	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Köln [31]	DKC	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
König AKP	AKP	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
König DKJ [80]	DKJ	325	Deutsche Ost-Afrika Line	300, **600**	P G	X	0.40	4.00
[illegible]	[illegible]	[illegible]	[illegible]	300, **600**	O	N	0.40 [33]	4.00 [33]

[illegible]	DKL	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
König Wilhelm II [31]	AKV	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Kronprinzessin Cecilie DKA [31]	DKA	250	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Kronprinz Wilhelm [31]	DKP	250	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Kybfels [80]	DKY	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
La Plata DLP [31]	DLP	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Lensahn	ALS	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Liebenfels [82]	DLB	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Lilly Rickmers [43]	DLY	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Loki [43 91]	DLK	200	Deutsch-Amerikanische Petroleum-Ges.	300, 600	P G	X	0.40	4.00
Loongmoon [31]	DLN	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Lothringen	ALO	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Löwenburg [80]	DLQ	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Lübeck ALK	ALK	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Lübeck DZC [80]	DZC	325	Deutsch-Australische D.S. Ges.	300, 600	P G	X	0.40	4.00
Lucie Woermann [31]	DLW	325	Woermann Line	300, 600	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Lüneburg [80]	DLU	325	Deutsch-Australische D.S. Ges.	300, 600	P G	X	0.40	4.00
Luxor [43]	DLX	200	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Mabel Rickmers [43]	DML	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Madeleine Rickmers [43]	DMC	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Main [31]	DKI	200	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Mai Rickmers [43]	DMT	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G	X	0.40	4.00
Mannheim [80]	DMM	325	Deutsch-Australische D.S. Ges.	300, 600	P G	X	0.40	4.00
Mark [31]	DMD	325	Norddeutscher-Lloyd	300, 600	P G	X	0.40	4.00
Markgraf	AMF	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Marksburg [80]	DMU	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Mecklenburg DMQ [31]	DMQ	100	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Mecklenburg AME	AME	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Medusa AMD	AMD	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Memphis DMP [43]	DMP	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Menes [43]	DMN	200	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Mera [43]	DMX	200	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Moltke AMT	AMT	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Möwe DMW [80]	DMW	100	D.S. Ges. Argo	300, 600	P G	8 a.m. to 1 p.m., 3 p.m. to 6 p.m., 8 p.m. to midnight	0.40	4.00
München	AMU	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Najade [31]	DNJ	60	Norddeutscher-Lloyd	300, 600	P G	10 a.m. to midday, 1 p.m. to 3 p.m.	0.12	—
Nassau	ANA	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Nautilus ANL	ANL	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Neckar [31]	DKK	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GERMANY—*contd.*							Francs.	Francs.
Negada [31]	DNA	325	D.S. Ges. Kosmos	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Neidenfels [80]	DNS	100	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Neuenfels [80]	DNU	100	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Nicaria [31]	DYP	100	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Niederwald [31]	DQR	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Niobe ANI	ANI	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Nitokris [31]	DNI	325	D.S. Ges. Kosmos	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Nixe [31]	DNX	60	Norddeutscher-Lloyd	300, **600**	P G	10 a.m. to midday, 1 p.m. to 3 p.m.	0.12	—
Nora-Hugo Stinnes II. [80]	DNH	200	Hugo Stinnes	300, **600**	P G	X	0.40	4.00
Norder	ANR	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Normannia DNO [43]	DNO	200	W. Kunstmann	300, **600**	P G	10 a.m. to 11 a.m., 3 p.m. to 4 p.m., 7 p.m. to 8 p.m.	0.40	4.00
Nymphe ANY	ANY	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Ockenfels [80]	DOC	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Odenwald [31]	DQS	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Odin AOD	AOD	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
O. J. D. Ahlers [80]	DAR	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Oldenburg	AOL	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Osiris DIS [43]	DIS	200	D.S. Ges. Kosmos	300, **600**	P G	X	0.40	4.00
Ostfriesland	AOF	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Otavi [31]	DQT	200	Hamburg-Amerika Line	300, **600**	P G	N	0.40	4.00
Otter	AOT	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Otto-Hugo Stinnes IX.	DOH	200	Hugo Stinnes	300, **600**	P G	X	0.40 [32]	4.00 [32]
Palatia [31]	DPJ	100	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Pallanza [31]	DDQ	200	Hamburg Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Panther APA	APA	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Patricia [31]	DDP	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00

Pawnee DPF [43]	DPF		...Ges.			X	0.40	4.00
Pelikan APE	APE	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Pennsylvania DDN [31]	DDN	200	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Persia DYS [31]	DYS	100	Hamburg-Amerika Line	300, 600	P G ..	X	0.40	4.00
Peter Rickmers [43]	DPM	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G ..	X	0.40	4.00
Pfeil	APF	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Pisa DDF [31]	DDF	200	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Planet	APL	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Polynesia [31]	DPO	325	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Pommern DPX [31]	DPX	200	Norddeutscher-Lloyd	300, 600	P G ..	X	0.40	4.00
Poseidon [77]	DPY	325	Government	300, 600	P G ..	8 a.m. to 8.30 a.m., 1.15 p.m. to 1.30 p.m., 8 p.m. to 8.30 p.m.	0.40	4.00
Posen APO	APO	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Posen DPQ [31]	DPQ	200	Norddeutscher-Lloyd	300, 600	P G ..	X	0.40	4.00
Präsident [31]	DPT	200	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
President Grant [31]	DDS	200	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
President Lincoln [31]	DDI	200	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Pretoria [31]	DDT	200	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Preussen APR	APR	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Preussen DPC [80 36]	DPC	110	Prussian Railway Administration	300, 375, 600	O [34] P R [35]	X	0.18 [37]	1.80 [37]
Primus [31 91]	DPV	200	Hamburg-Amerika Line	300, 600	P G ..	X	0.40	4.00
Princess Alice DKZ [31] ..	DKZ	200	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Prinz August Wilhelm [31] ..	DSB	200	Hamburg - Amerika Line (Atlas Line)	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.25 [39]	2.50 [39]
Prinz Eitel Friedrich DPE [31]	DPE	325	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Prinz Eitel Friedrich DSI [31]	DSI	200	Hamburg - Amerika Line (Atlas Line)	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.25 [39]	2.50 [39]
Prinzessin [31]	DPN	325	Deutsche Ost-Afrika Line ..	300, 600	P G ..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Prinzessin Heinrich [31] ..	DPD	60	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.12	—
Prinzess Irene [31]	DKE	200	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Prinzess Wilhelm	AWL	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Prinz Friedrich Wilhelm [31] ..	DKF	250	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Prinz Heinrich AHR ..	AHR	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Prinz Joachim [31]	DSP	200	Hamburg - Amerika Line (Atlas Line)	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m	0.25 [39]	2.50 [39]
Prinz Ludwig [31]	DPL	325	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Prinz Oskar [31]	DDO	200	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Prinzregent [31]	DPG	325	Deutsche Ost-Afrika Line ..	300, 600	P G ..	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Prinzregent Luitpold ALP ..	ALP	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Prinz Sigismund [31]	DSG	200	Hamburg - Amerika Line (Atlas Lin)	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.25 [39]	2.50 [39]
Prussia [31]	DJL	200	Hamburg-Amerika Line	300, 600	P G ..	X	0.40	4.00
Ramses [43]	DKM	325	D.S. Ges. Kosmos	300, 600	P G ..	X	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GERMANY—*contd.*							Francs.	Francs.
Rauenfels [80]	DUE	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Regina [80]	DRI	200	Stettin Rigaer D.S. Ges. Th. Gribel.	300, **600**	P G	— [42]	0.25	2.50
Rhaetia [31]	DRE	325	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Rhakotis [31]	DRH	325	D.S. Ges. Kosmos	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Rhein [31]	DKR	200	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Rheinland ARL	ARL	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Rheinland DRJ [31]	DRJ	200	Norddeutscher-Lloyd	300, **600**	P G	X	0.40	4.00
Rhenania DRZ [43]	DRZ	200	W. Kunstmann	300, **600**	P G	10 a.m. to 11 a.m., 3 p.m. to 4 p.m., 7 p.m. to 8 p.m.	0.40	4.00
Rhodopis [31]	DRS	325	D.S. Ges. Kosmos	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Rio Grande DRR [31]	DRR	325	Hamburg-Süd. Am. D.S. Ges.	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Rio Negro [31]	DRQ	325	Hamburg-Süd. Am. D.S. Ges.	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Rio Pardo [31]	DRP	325	Hamburg-Süd. Am. D.S. Ges.	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Roda [31]	DRA	325	D.S. Ges. Kosmos	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Roland DRB [80]	DRB	75	Vereinigte Bugsir- und Fracht-schiffahrts-Ges.	300, **600**	P G	X	0.40	4.00
Roland DRV [80]	DRV	325	Roland Line	300, **600**	P G	X	0.40	4.00
Roon ARO	ARO	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Roon DRN [31]	DRN	325	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Rugia [31]	DRU	325	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Rüstringen	ARU	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Sachsen [31]	DQX	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
[illegible]	[illegible]	[illegible]	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00

Sakkarah [43]	DYD	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Salamanca [31]	DSH	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Salatis [43]	DYC	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Sambia [31]	DYM	100	Hamburg-Amerika Line	300, 600	P G	X	0.40	4.00
San Nicolas [31]	DIC	325	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Cruz DNZ [31]	DNZ	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Elena [31]	DNL	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Fé [31]	DNN	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Maria DNM [31]	DNM	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santa Rita DNR [31]	DNR	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Santos [31]	DTO	200	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sao Paulo DOO [31]	DOO	325	Hamburg-Süd. Am. D.S. Ges.	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Scandia [31]	DJN	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Scharnhorst [31]	DSA	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Schildturm [80]	DTX	200	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Schlesien	ASN	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Schleswig [31]	DSW	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Schleswig-Holstein	ASX	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Schönfels [80]	DXB	100	D.S. Ges. Hansa	300, 600	P G	X	0.40	4.00
Schwaben	ASA	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Schwalbe [80]	DSL	100	D.S. Ges. Argo	300, 600	P G	8 a.m. to 1 p.m., 3 p.m. to 6 p.m., 8 p.m. to midnight	0.40 [32]	4.00 [32]
Schwan [80]	DSN	100	D.S. Ges. Argo	300, 600	P G	8 a.m. to 1 p.m., 3 p.m. to 6 p.m., 8 p.m. to midnight	0.40 [32]	4.00 [32]
Schwarzwald [31]	DSX	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sebara [43]	DYE	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Secundus [31] [91]	DUS	100	Hamburg-Amerika Line	300, 600	P G	X	0.40	4.00
Seeadler ASE	ASE	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Seeadler DSE [80]	DSE	60	Norddeutscher-Lloyd	300, 600	— [38]	10 a.m. to midday, 4 p.m. to 6 p.m.	0.40	4.00
Serapis [43]	DIP	200	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Setos [43]	DYF	325	D.S. Ges. Kosmos	300, 600	P G	X	0.40	4.00
Sevilla [31]	DQY	200	Hamburg-Amerika Line	300, 600	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Seydlitz AST	AST	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Seydlitz DSZ [31]	DSZ	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Siegfried	ASI	—	Navy	300, 600	O ..	N	0.40 [33]	4.00 [33]
Sierra Cordoba [31]	DOD	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Sierra Nevada [31]	DNE	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00
Sierra Salvada [31]	DVA	325	Norddeutscher-Lloyd	300, 600	P G	N	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GERMANY—*contd.*							Francs.	Francs.
Sierra Ventana [31]	DVE	325	Norddeutscher-Lloyd	300, **600**	P G	N	0.40	4.00
Sikiang [31]	DGS	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Silesia DJP [31]	DJP	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Silvana [31]	DAV	60	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.12	—
Silvia [31]	DSQ	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Sirius DIU [43]	DIU	200	Deutsch - Amerikanische Petroleum Ges.	300, **600**	P G	X	0.40	4.00
Sisak [80]	DYH	325	D.S. Ges. Kosmos	300, **600**	P G	X	0.40	4.00
Sithonia [31]	DTH	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Sleipner	ASL	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Solfels [80]	DOU	200	D.S. Ges. Hansa	300, **600**	P G	X	0.40	4.00
Sonnenberg [80]	DDD	200	Hermann Kimme	300, **600**	P G	X	0.40	4.00
Staatssekretär Kraetke [31]	DTK	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Steiermark [31]	DJS	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Steigerwald [31]	DGD	200	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Stephan [80 122]	DSC	325	Norddeutsche Seekabelwerke Coy.	300, **600**	— [38]	X	—	—
Stettin	ASY	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Stolberg [80]	DLG	325	Deutsch-Australische D.S. Ges.	300, **600**	P G	X	0.40	4.00
Stralsund	ASM	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Strassburg	ASK	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Stuttgart	ASZ	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Suevia [31]	DJT	200	Hamburg-Amerika Line	300, **600**	P G	X	0.40	4.00
Sydney DSY [80]	DSY	325	Deutsch-Australische D.S. Ges.	300, **600**	P G	X	0.40	4.00
Tanis [43]	DTJ	200	D.S. Ges. Kosmos	300, **600**	P G	9.30 a.m. to 5.30 p.m., 9.30 p.m. to 1.30 a.m.	0.40	4.00
Tasmania [80]	DTB	325	Deutsch-Australische D.S. Ges.	300, **600**	P G	X	0.40	4.00
Thessalia [31]	DTE	325	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Thetis ATH	ATH	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
Thüringen	ATU	—	Navy	300, **600**	O	N	0.40 [33]	4.00 [33]
[illegible] [31]	[illegible]	325	Hamburg-Amerika Line	300, **600**	P G	10 a.m. to midday, [illegible]	0.40	4.00

Tijuca [31]	DUC	325	Hamburg-Süd. Am. D.S. Ges.	[illegible]	[illegible]	midnight to 2 a.m.		
[illegible]	AIG	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Totmes [43]	DYX	325	D.S. Ges. Kosmos	300, 600	P G ..	X	0.40	4.00
Trautenfels [80]	DTR	200	D.S. Ges. Hansa	300, 600	P G ..	X	0.40	4.00
Tucuman [31]	DMA	325	Hamburg-Süd. Am. D.S. Ges. ..	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Uarda [43]	DUU	200	D.S. Ges. Kosmos	300, 600	P G ..	X	0.40	4.00
Uhenfels [80]	DUH	200	D.S. Ges. Hansa	300, 600	P G ..	X	0.40	4.00
Ulm [80]	DVM	325	Deutsch-Australische D.S. Ges. ..	300, 600	P G ..	X	0.40	4.00
Ursula Rickmers [43]	DUL	200	Rickmers Reismühlen, Reederei und Schiffbau, A.G.	300, 600	P G ..	X	0.40	4.00
Valencia [31]	DVC	200	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Valesia [31]	DVL	200	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Vaterland DVD [31]	DVD	325	Hamburg-Amerika Line	300,600, 1,800	P G ..	N	0.40	4.00
Victoria Luise AVL	AVL	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Victoria Luise DDL [31] ..	DDL	325	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Vineta	AVN	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Virginia DVI [31]	DVI	200	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Vulkan	AVU	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Wachtfels [80]	DOW	200	D.S. Ges. Hansa	300, 600	P G ..	X	0.40	4.00
Wartburg [80]	DWC	200	D.S. Ges. Hansa	300, 600	P G ..	X	0.40	4.00
Wasgenwald [31]	DWG	200	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.40	4.00
Westfalen	AWA	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Westmark [31]	DZB	100	Hamburg-Amerika Line	300, 600	P G ..	X	0.40	4.00
Wettin	AWE	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Wiegand [80]	DWI	325	Roland Line	300, 600	P G ..	X	0.40	4.00
Wilhelms [80]	DWS	100	Government at Köslin	300, 600	particular correspondence	X	0.40	4.00
Willehad [31]	DWH	200	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Willkommen [31]	DWN	60	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday, midnight to 2 a.m.	0.12	—
Windhuk [31]	DWK	325	Hamburg-Amerika Line	300, 600	P G ..	10 a.m. to midday. midnight to 2 a.m.	0.40	4.00
Wismar [80]	DWR	325	Deutsch-Australische D.S. Ges. ..	300, 600	P G ..	X	0.40	4.00
Wittekind [31]	DWD	200	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Wittelsbach	AWI	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Wörth	AWO	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Wotan [43] [91]	DWO	200	Deutsch-Amerikanische Petroleum Ges.	300, 600	P G ..	X	0.40	4.00
Württemberg	AWU	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Yorck [31]	DYK	325	Norddeutscher-Lloyd	300, 600	P G ..	N	0.40	4.00
Ypiranga [31]	DYA	250	Hamburg-Amerika Line	300, 600	P G ..	N	0.40	4.00
Zähringen	AZA	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]
Zieten AZI	AZI	—	Navy	300, 600	O	N	0.40 [33]	4.00 [33]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN							Francs.	Francs.
Abinsi	MVP	200	Elder Dempster	300, **600**	P G	—	0.40	—
Abosso [44]	GDI	250	Elder Dempster	300, **600**	P G	X	0.40	—
Acasta	BHS	—	Navy	—	O	—	—	—
Achates	BHT	—	Navy	—	O	—	—	—
Acheron	BHU	—	Navy	—	O	—	—	—
Achilles BCY	BCY	—	Navy	—	O	—	—	—
Acorn	BHV	—	Navy	—	O	—	—	—
Actaeon	BOP	—	Navy	—	O	—	—	—
Active BHD	BHD	—	Navy	—	O	—	—	—
Adamant	BPN	—	Navy	—	O	—	—	—
Adriatic [44]	MHC	250	White Star Line	300, **600**	P G	N	0.40	—
Adventure BHK	BHK	—	Navy	—	O	—	—	—
Aeneas [44]	MFU	250	A. Holt & Co.	300, **600**	P G	X	0.40	—
Aeolus	BEV	—	Navy	—	O	—	—	—
Africa BAA	BAA	—	Navy	—	O	—	—	—
Afridi	BHW	—	Navy	—	O	—	—	—
Agadir [44]	GFE	150	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Agamemnon	BAB	—	Navy	—	O	—	—	—
Aidan [44]	MFM	250	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Ajana [75]	GTI	250	Australind Steam Shipping Co.	300, **600**	P G	9.15 a.m. to 1 p.m., 4.30 p.m. to midnight	0.40	—
Ajax BAC	BAC	—	Navy	—	O	—	—	—
Ajax GUZ [80]	GUZ	175	A. Holt & Co.	300, **600**	P G	X	0.40	4.00
Akabo [44]	MZE	250	Elder Dempster	300, **600**	P G	X	0.40	—
Alacrity	BQI	—	Navy	—	O	—	—	—
Alarm	BHX	—	Navy	—	O	—	—	—
Albacore	BKE	—	Navy	—	O	—	—	—
Alban [75]	GWW	225	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Albemarle	BAD	—	Navy	—	O	—	—	—
Albion	BAE	—	Navy	—	O	—	—	—
Alecto	BPO	—	Navy	—	O	—	—	—
Alert BQA	BQA	—	Navy	—	O	—	—	—
Almanzora [44]	—	—	Royal Mail Steam Packet Co.	300, **600**	P G	—	—	—
Almora [44]	YYR	—	Houlder, Middleton & Co.	300, **600**	P G	—	0.40	—
Alnwick Castle [44]	GFH	250	Union Castle	300, **600**	P G	X	0.40	—
Alsatian [44]	GYH	250	Allan Line	300, **600**	P G	N	0.40	—
Amazon BHY	BHY	—	Navy	—	O	—	—	—

[illegible]	GFT	140	Eastern Telegraph Co.	300, 450, 600	P ..	—	0.40	—
Ambrose [44]	MDR	250	Booth S.S. Co.	300, 600	P G	X	0.40	—
Ambuscade	BHZ	—	Navy	—	O ..	—	—	—
Amethyst	BGN	—	Navy	—	O ..	—	—	—
Amphitrite BEF	BEF	—	Navy	—	O ..	—	—	—
Amsterdam [80]	GPF	130	Great Eastern Railway	300, 450, 600 [45]	P R [47]	N	0.10	1.00
Anchises [44]	MFW	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Andania [44]	GAH	250	Cunard Line	300, 600	P G	N	0.40	—
Andes MRQ [44]	MRQ	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Andorinha [44]	MIU	250	Yeoward Bros.	300, 600	P G	X	0.40	—
Andromache	BQQ	—	Navy	—	O ..	—	—	—
Anglian [44]	MNR	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Anglo-Mexican [44]	YYC	—	Nitrate Producers S.S. Co.	300, 600	P G	—	0.40	—
Anglo-Patagonian [44]	GRC	—	Nitrate Producers S.S. Co.	300, 600	P G	—	0.40	—
Anglo-Saxon [44]	GUB	—	Nitrate Producers S.S. Co.	300, 600	P G	—	0.40	—
Angora [44]	GFL	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Anselm [44]	MDK	250	Booth S.S. Co.	300, 600	P G	X	0.40	—
Antelope	BPP	—	Navy	—	O ..	—	—	—
Antillian [44]	MJL	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Antilochus [80]	GTC	90	A. Holt & Co.	300, 450, 600	P G	X	0.40	4.00
Antony [44]	MAY	250	Booth S.S. Co.	300, 600	P G	X	0.40	—
Antrim BCZ	BCZ	—	Navy	—	O ..	—	—	—
Antrim GPN [80]	GPN	150	Midland Railway Co.	300, 400, 600 [46]	P R [48]	N	0.05	0.50
Aparima [81]	GIM	250	Union S.S. Co. of New Zealand	300, 600	P G	X	0.40	—
Apollo	BQR	—	Navy	—	O ..	—	—	—
Appalachee [44]	GFM	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Appam [44]	GDJ	250	Elder Dempster	300, 600	P G	X	0.40	—
Aquarius	BQS	—	Navy	—	O ..	—	—	—
Aquitania [44]	MSU	350	Cunard Line	300, 600	P G	N	0.40	—
Arab	BIA	—	Navy	—	O ..	—	—	—
Aracataca [44]	MLB	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Aragon [44]	MBN	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Araguaya [44]	MBG	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Arankola [44]	GFN	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Arawa [44]	MWE	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Arcadian [44]	MJR	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40 [49]	— [49]
Archer	BIB	—	Navy	—	O ..	—	—	—
Ardeola [44]	GCJ	250	Yeoward Bros.	300, 600	P G	X	0.40	—
Argonaut	BEH	—	Navy	—	O ..	—	—	—
Argyllshire [51]	GTJ	220	Scottish Shire Line	300, 450, 600	P G	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m. 8 p.m. to 1 a.m.	0.40	—
Ariadne	BEI	—	Navy	—	O ..	—	—	—
Ariel	BID	—	Navy	—	O ..	—	—	—
Arlanza [44]	GFP	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Armadale [75]	GQT	250	Australind S.S. Co.	300, 600	P G	9.15 a.m. to 1 p.m., 4.30 p.m. to midnight	0.40	—
Armadale Castle [44]	MQG	250	Union Castle	300, 600	P G	N	0.40	—
Aronda [44]	MAZ	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Arracan [75]	GWO	180	British & Burmese Steam Nav. Co.	300, 600	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Arrino [75]	GQU	250	Australind S.S. Co.	300, **600**	P G	9.15 a.m. to 1 p.m., 4.30 p.m. to midnight	0.40	—
Arrogant	BEW	—	Navy	—	O	—	—	—
Arun	BIE	—	Navy	—	O	—	—	—
Arundel [88]	MDZ	90	L.B. & S.C. Railway Co.	300, **600**	P G	N	0.15 [50]	1.50 [50]
Arzila [44]	GFQ	150	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Ascania [44]	MTU	250	Cunard Line	300, **600**	P G	N	0.40	—
Ascanius [44]	MFV	250	A. Holt & Co.	300, **600**	P G	X	0.40	—
Ascot [44]	MKZ	150	Britain S.S. Co.	300, **600**	P G	X	0.40	—
Ashtabula GKC [44]	GKC	150	Anglo-American Oil Co.	300, **600**	P G	X	0.40	—
Asian [44]	MKL	250	F. Leyland & Co.	300, **600**	P G	N	0.40	—
Aspinet [92]	GTY	125	Tank Storage & Carriage Co.	300, **600**	P	X	—	—
Assaye [44]	MOO	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Assistance	BOM	—	Navy	—	O	—	—	—
Astraea	BEX	—	Navy	—	O	—	—	—
Asturias [44]	MBB	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	—	—
Atahualpa [44]	MDU	250	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Athenia [44]	MBA	250	Donaldson Bros.	300, **600**	P G	N	0.40	—
Athenic [44]	MWN	250	White Star Line	300, **600**	P G	X	0.40	—
Atlantian [44]	MVL	250	F. Leyland & Co.	300, **600**	P G	N	0.40	—
Attack	BIF	—	Navy	—	O	—	0.40	—
Attentive	BHL	—	Navy	—	O	—	—	—
Aurora	BGA	—	Navy	—	O	—	—	—
Ausonia [44]	MTR	250	Cunard Line	300, **600**	P G	N	0.40	—
Australind [75]	GQW	250	Australind S.S. Co.	300, **600**	P G	9.15 a.m. to 1 p.m., 4.30 p.m. to midnight	0.40	—
Ava [75]	GWE	140	British & Burmese Steam Nav. Co.	300, **600**	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Avon BIG	BIG	—	Navy	—	O	—	—	—
Ayrshire [51]	GQA	220	Scottish Shire Line	300, 450, **600**	P G	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Bacchante BDB	BDB	—	Navy	—	O	—	—	—
Badger	BIH	—	Navy	—	O	—	—	—
Ballarat [44]	MKQ	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—

Balmoral Castle [44]	MDW	[illegible]	[illegible] Line	300, 600	P G	N	0.40	—
Bamora [44]	MST	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Banca [44]	MFS	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Bandra [44]	MCH	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Bangala [44]	GAC	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Bankura [44]	GCH	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Barala [44]	GCM	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Baralong [44]	MWV	—	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Barham	BAW	—	Navy	—	O	—	—	—
Barjora [44]	GCT	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Baroda [44]	GDL	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Baron Ardrossan [44]	MWW	—	Hogarth Shipping Co.	300, 600	P G	X	0.40	—
Baron Jedburgh [44]	MGD	250	Hogarth Shipping Co.	300, 600	P G	X	0.40	—
Baron Napier [44]	MJS	250	Hogarth Shipping Co.	300, 600	P G	X	0.40	—
Baron Polwarth [44]	GRB	160	Hogarth Shipping Co.	300, 600	P G	X	0.40	—
Barpeta [44]	MPR	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Barranca [44]	MLL	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Basilisk	BII	—	Navy	—	O	—	—	—
Bay State [44]	YYY	160	White Diamond S.S. Co. (G. Warren & Co.)	300, 600	P G	—	0.40	—
Beacon Grange [44]	GFG	250	Houlder Line	300, 600	P G	X	0.40	—
Beagle	BIJ	—	Navy	—	O	—	—	—
Beaver BIK	BIK	—	Navy	—	O	—	—	—
Bellerophon BAG	BAG	—	Navy	—	O	—	—	—
Bellerophon GTD [80]	GTD	90	A. Holt & Co.	300, 450, 600	P G	X	0.40	4.00
Bellona	BHF	—	Navy	—	O	—	—	—
Beltana [44]	MKR	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Bempton [44]	MHS	100	Hull Steam Fishing & Ice Co.	300, 600	P	X	0.05 [89]	0.50 [89]
Benalla [44]	GBJ	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Benbow	BAH	—	Navy	—	O	—	—	—
Benefactor [44]	MOE	250	T. & J. Harrison	300, 600	P G	X	0.40	—
Berbera [44]	GPD	250	British India Steam Nav. Co	300, 600	P G	X	0.40	—
Berbice [44]	GIF	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Bermudian [54]	MBD	200	Canada Steamship Lines (Quebec S.S. Division)	300, 600	P G	N	0.40	—
Berwick	BDC	—	Navy	—	O	—	—	—
Berwick Castle [44]	GFJ	250	Union Castle	300, 600	P G	X	0.40	—
Berwindvale [44]	GFR	250	Berwindvale S.S. Co.	300, 600	P G	X	0.40	—
Bharata [44]	GAD	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Birmingham BEY	BEY	—	Navy	—	O	—	—	—
Bittern	BIL	—	Navy	—	O	—	—	—
Blake	BPC	—	Navy	—	O	—	—	—
Blanche	BHG	—	Navy	—	O	—	—	—
Blenheim	BPD	—	Navy	—	O	—	—	—
Bloemfontein [44]	GBN	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Blonde	BHH	—	Navy	—	O	—	—	—
Bloodhound [52]	YYI	—	Murray & Crawford	300, 600	P G	—	0.40	—
Boadicea	BHI	—	Navy	—	O	—	—	—
Bohemian [44]	MEL	250	F. Leyland & Co.	300. 600	P G	N	0.40	—
Bolton Castle [44]	MAQ	150	Lancashire Shipping Co.	300, 600	P G	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Bonaventure BPE	BPE	—	Navy	—	O	—	—	—
Bonetta	BKI	—	Navy	—	O	—	—	—
Borda MFQ [44]	MFQ	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Borderer [44]	GCL	150	Borderdale Shipping Co.	300, **600**	P G	X	0.40	—
Botanist [44]	MAP	250	T. & J. Harrison	300, **600**	P G	X	0.40	—
Bovic [44]	GDO	250	White Star Line	300, **600**	P G	X	0.40	—
Boyne	BIM	—	Navy	—	O	—	—	—
Bramble	BPQ	—	Navy	—	O	—	—	—
Brighton [80]	MOV	95	L.B. & S.C. Railway Co.	300, **600**	P G	N	0.15 [50]	1.50 [50]
Brilliant BEZ	BEZ	—	Navy	—	O	—	—	—
Brisbane River [44]	GRJ	120	British Empire S. Nav. Co. (Houlder Bros. & Co.)	—	P G	—	0.40	—
Brisk	BIN	—	Navy	—	O	—	—	—
Bristol	BFA	—	Navy	—	O	—	—	—
Britannia BAI	BAI	—	Navy	—	O	—	—	—
Britannia GFV [80] [122]	GFV	140	Eastern Telegraph Co.	300, 450, **600**	P	—	0.40	—
British Sun [44]	MGT	110	British Sun Co.	300, **600**	P	—	—	—
Britomart	BPR	—	Navy	—	O	—	—	—
Briton [44]	MQJ	250	Union Castle	300, **600**	P G	N	0.40	—
Brodmount [44]	MYP	250	Blue Star Line	300, **600**	P G	X	0.40	—
Brodstone [44]	MIS	250	Blue Star Line	300, **600**	P G	X	0.40	—
Brodvale [44]	MRB	250	Blue Star Line	300, **600**	P G	X	0.40	—
Brussels [80]	GPG	130	Great Eastern Railway	300, 450, **600** [45]	P R [47]	N	0.10	1.00
Buffalo GFW [44]	GFW	250	T. Wilson, Sons & Co.	300, **600**	P G	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Bulldog	BIO	—	Navy	—	O	—	—	—
Bulysses [44]	MZA	150	Anglo-Saxon Petroleum Co.	300, **600**	P G	X	0.40	—
Burma	BQL	—	Navy	—	O	—	—	—
Burmese Prince [44]	GRP	—	Prince Line	—	—	—	—	—
Burutu [44]	MZU	250	Elder Dempster	300, **600**	P G	X	0.40	—
Byron [54]	GDH	250	Lamport & Holt	300, **600**	P G	N	0.40	—
Cadmus	BQB	—	Navy	—	O	—	—	—
Cæsar BAK	BAK	—	Navy	—	O	—	—	—
Caesarea [44]	MSZ	250	London & South Western Railway	300, **600**	P G	N	0.15	1.50
Calabria MAJ [44]	MAJ	250	Anchor Line	300, **600**	P G	N	0.40	—
[illegible]	[illegible]	[illegible]	A. Holt & Co.	300, **600**	P G	X	0.40	—

Calgarian [44]	MJU	250	Allan Line	300, 600	P G	N	0.40	—
California MWH [44]	MWH	250	Pacific Steam Nav. Co.	300, 600	P G	N	0.40	—
Cambria GRG [80]	GRG	170	London & North Western Railway	300, 600	P G	N	0.05	0.50
Cambria MCG [80 122]	MCG	140	Eastern Telegraph Co.	300, 450, 600	P	—	0.40	—
Cambrian BFB	BFB	—	Navy	—	O	—	—	—
Cambrian MNT [44]	MNT	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Cameleon	BIP	—	Navy	—	O	—	—	—
Cameronia [44]	MIO	250	Anchor Line	300, 600	P G	N	0.40	—
Canada MCF [44]	MCF	250	Dominion Line	300, 600	P G	N	0.40	—
Canadian [44]	MGL	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Canara [44]	GAF	170	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Candia [44]	MPH	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Canning [44]	GKG	250	Lamport & Holt	300, 600	P G	X	0.40	—
Canopic [44]	MPC	250	White Star Line	300, 600	P G	N	0.40	—
Canopus	BAL	—	Navy	—	O	—	—	—
Caraquet [44]	MQD	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Cardiganshire [44]	MAU	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Cardium [44]	MZB	150	Anglo-Saxon Petroleum Co.	300, 600	P G	X	0.40	—
Caribbean [44]	GBR	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Carisbrook Castle [44]	MOW	250	Union Castle	300, 600	P G	N	0.40	—
Carmania [44]	MAA	250	Cunard Line	300, 600	P G	N	0.40	—
Carmarthenshire [44]	MUS	200	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Carnarvon	BDE	—	Navy	—	O	—	—	—
Carnarvonshire [44]	MZR	250	Royal Mail Steam Packet Co.	300 600	P G	N	0.40	—
Caroline BUA	BUA	—	Navy	—	O	—	—	—
Caronia [44]	MRA	350	Cunard Line	300, 600	P G	N	0.40	—
Carpathia [44]	MPA	250	Cunard Line	300, 600	P G	N	0.40	—
Carpentaria [44]	MHG	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Carthaginian [44]	MHN	250	Allan Line	300, 600	P G	N	0.40	—
Cassandra [44]	MED	250	Donaldson Bros.	300, 600	P G	N	0.40	—
Cassis [44]	MPO	250	Anglo-Saxon Petroleum Co.	300, 600	P G	X	0.40	—
Castalia [44]	MWZ	250	Anchor Line	300, 600	P G	X	0.40	—
Cawdor Castle [44]	GFZ	250	Union Castle	300, 600	P G	X	0.40	—
Cedric [44]	MDC	250	White Star Line	300, 600	P G	N	0.40	—
Celtic MLC [44]	MLC	250	White Star Line	300, 600	P G	N	0.40	—
Centurion	BAM	—	Navy	—	O	—	—	—
Ceramic [44]	MCP	250	White Star Line	300, 600	P G	X	0.40	—
Cestrian [44]	MHL	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Chagres [44]	GCN	250	Elders & Fyffes	300, 600	P G	X	0.40	—
Chakdara [44]	MUO	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Chakdina [44]	MZY	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Chakla [44]	MWQ	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Chakrata [44]	GPE	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Chaleur [44]	GMN	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Challenger	BFC	—	Navy	—	O	—	—	—
Champion	BTY	—	Navy	—	O	—	—	—
Changuinola [44]	MPM	200	Elders & Fyffes	300, 600	P G	X	0.40	—
Charybdis	BFD	—	Navy	—	O	—	—	—
Chatham	BFE	—	Navy	—	O	—	—	—
Chaudiere [44]	GDK	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Cheerful	BIQ	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Chelmer	BIR	—	Navy	—	O	—	—	—
Chenab [75]	GWK	115	James Nourse, Ltd.	300, **600**	P G	X	0.40	—
Cherwell	BIS	—	Navy	—	O	—	—	—
Cheyenne GGB [44]	GGB	150	Anglo-American Oil Co.	300, **600**	P G	X	0.40	—
Chignecto [44]	MBV	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Chile GGC [44]	GGC	250	Pacific Steam Nav. Co.	300, **600**	P G	N	0.40	—
Chilka [44]	GGD	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
China MMU [44]	MMU	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Chindwara [44]	GAR	140	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Chindwin [75]	GWG	180	British & Burmese Steam Nav. Co.	300, **600**	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Chinkoa [44]	MKO	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Chipana [54]	YYQ	—	New York & Pacific S.S. Co.	300, **600**	P G	—	0.40	—
Chiria [80]	GUV	30	James Bird, London	300, **600**	P	X	—	—
Chirripo [44]	MLP	150	Elders & Fyffes	300, **600**	P G	X	0.40	—
Christopher	BIT	—	Navy	—	O	—	—	—
Chupra [44]	GPU	180	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Chyebassa [44]	MYF	160	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Circassia [44]	MWY	250	Anchor Line	300, **600**	P G	X	0.40	—
City of Athens [44]	MVB	160	City Line (G. Smith & Sons)	300, **600**	P G	—	0.40	—
City of Baroda [44]	GPC	150	Hall Line	300, **600**	P G	X	0.40	—
City of Benares [44]	GED	250	City Line (G. Smith & Sons)	300, **600**	P G	X	0.40	—
City of Bombay [44]	GUJ	150	Hall Line	300, **600**	P G	X	0.40	—
City of Bristol [44]	GEC	150	Hall Line	300, **600**	P G	X	0.40	—
City of Cairo [44]	YYV	—	Hall Line	300, **600**	P G	—	0.40	—
City of Calcutta [44]	GEE	250	City Line (G Smith & Sons)	300, **600**	P G	N	0.40	—
City of Chester [44]	MAG	150	Hall Line	300, **600**	P G	X	0.40	—
City of Colombo [44]	GYG	150	Hall Line	300, **600**	P G	X	0.40	—
City of Corinth [44]	MFE	150	Hall Line	300, **600**	P G	X	0.40	—
City of Delhi [44]	GIC	150	City Line (G. Smith & Sons)	300, **600**	P G	N	0.40	—
City of Dunkirk [44]	GDD	150	Hall Line	300, **600**	P G	X	0.40	—
City of Durham [44]	GET	150	Hall Line	300, **600**	P G	X	0.40	—
City of Edinburgh [44]	GNC	150	City Line (G. Smith & Sons)	300, **600**	P G	X	0.40	—
City of Exeter [44]	MSW	200	City Line (G. Smith & Sons)	300, **600**	P G	X	0.40	—
City of Florence [44]	GPY	140	Hall Line	300, **600**	P G	X	0.40	—
City of Glasgow [44]	GEU	250	City Line (G. Smith & Sons)	300, **600**	P G	X	0.40	—

City of London[44]	GEV	250	City Line (G. Smith & Sons)	300, 600	P G	X	0.40	—
City of Madras[44]	MCY	150	Hall Line	300, 600	P G	X	0.40	—
City of Madrid[44]	MTM	125	City Line (G. Smith & Sons)	300, 600	P G	X	0.40	—
City of Marseilles[44]	GEW	250	Hall Line	300, 600	P G	N	0.40	—
City of Nagpur[44]	MUJ	200	Hall Line	300, 600	P G	X	0.40	—
City of Naples[44]	GEO	150	Hall Line	300, 600	P G	X	0.40	—
City of Newcastle[44]	YYU	—	Hall Line	300, 600	P G	—	0.40	—
City of Norwich[44]	GYA	150	Hall Line	300, 600	P G	X	0.40	—
City of Paris[44]	GER	250	City Line (G. Smith & Sons)	300, 600	P G	X	0.40	—
City of Poona[44]	GBB	250	City Line (G. Smith & Sons)	300, 600	P G	X	0.40	—
City of Rangoon[44]	MTP	135	Hall Line	300, 600	P G	X	0.40	—
City of Vienna[44]	MSK	150	Hall Line	300, 600	P G	X	0.40	—
City of York[44]	GAO	250	City Line (G. Smith & Sons)	300, 600	P G	X	0.40	—
Clan Colquhoun[44]	YZA	150	Cayzer, Irvine & Co.	300, 600	—	—	0.40	—
Clan Macewen[80]	GVH	100	Cayzer, Irvine & Co.	300, 600	P	X	0.40	—
Clan Macrae[80]	GVM	100	Cayzer, Irvine & Co.	300, 600	P	X	0.40	—
Clan Sinclair[44]	YZB	160	Cayzer, Irvine & Co.	300, 600	—	—	0.40	—
Clan Urquhart[44]	YZG	—	Cayzer, Irvine & Co.	300, 600	—	—	0.40	—
Clearway[44]	MYH	250	Anglo-Oriental Nav. Co. ...	300, 600	P G	X	0 40	—
Clio	BQC	—	Navy	—	O	—	—	—
Cluny Castle[44]	GGE	250	Union Castle	300, 600	P G	X	0.40	—
Cochrane BDF	BDF	—	Navy	—	O	—	—	—
Cockatrice	BIU	—	Navy	—	O	—	—	—
Coconada[44]	GGF	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Colaba[44]	GBT	170	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Colchester[80]	GPH	130	Great Eastern Railway	300, 450, 600[45]	P R[47]	N	0.10	1.00
Collegian[44]	MVT	—	T. & J. Harrison	300, 600	P G	X	0.40	—
Collingwood	BAN	—	Navy	—	O	—	—	—
Colne	BIV	—	Navy	—	O	—	—	—
Colonia MCL[60 122]	MCL	140	Telegraph Construction & Maintenance Co.	300, 600	P	—	—	—
Colonian[44]	MGW	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Colorado[44]	MMS	250	T. Wilson, Sons & Co.	300, 600	P G	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Colossus	BAO	—	Navy	—	O	—	—	—
Comanchee[44]	GGG	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Comet BSQ	BSQ	—	Navy	—	O	—	—	—
Commonwealth BAP	BAP	—	Navy	—	O	—	—	—
Commonwealth GGH[44]	GGH	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Comrie Castle[44]	GGI	250	Union Castle	300, 600	P G	X	0.40	—
Comus BTW	BTW	—	Navy	—	O	—	—	—
oonnaught[44]	MCU	140	City of Dublin Steam Packet Co.	300, 600	P G	N	0.05	0.50
Conqueror BAQ	BAQ	—	Navy	—	O	—	—	—
Conqueror GID[4 44]	GID	150	Duke of Manchester	300, 600	P G	X	0.40	—
Contest ...	BIX	—	Navy	—	O	—	—	—
Cooeyanna[44]	GBV	—	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Copenhagen[80]	GPI	130	Great Eastern Railway	300, 450, 600[45]	P R[47]	N	0.10	1.00
Corcovado MIE[44]	MIE	250	Pacific Steam Navigation Co.	300, 600	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Cordelia	BUB	—	Navy	—	O	—	—	—
Corinthian[44]	MKN	250	Allan Line	300, 600	P G	N	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Corinthic [44]	MWT	250	White Star Line	300, **600**	P G	X	0.40	—
Cormorant [60 122]	MFJ	140	Western Telegraph Co.	300, **600**	P	—	—	—
Cornishman [44]	GDW	250	Dominion Line	300, **600**	P G	X	0.40	—
Cornwall	BDG	—	Navy	—	O	—	—	—
Corsican [44]	MCN	250	Allan Line	300, **600**	P G	N	0.40	—
Cossack	BIY	—	Navy	—	O	—	—	—
Crane	BKL	—	Navy	—	O	—	—	—
Crescent	BEJ	—	Navy	—	O	—	—	—
Cretic [44]	MRC	250	White Star Line	300, **600**	P G	N	0.40	—
Crown of Seville [44]	MTL	150	Crown S.S. Co.	300, **600**	P G	X	0.40	—
Crown of Toledo [44]	MHV	250	Crown S.S. Co.	300, **600**	P G	X	0.40	—
Crusader	BIZ	—	Navy	—	O	—	—	—
Cufic [44]	GDR	250	White Star Line	300, **600**	P G	X	0.40	—
Culna [44]	GOQ	160	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Cumberland BDI	BDI	—	Navy	—	O	—	—	—
Custodian [44]	GCE	250	T. & J. Harrison	300, **600**	P G	X	0.40	—
Cuyahoga [44]	MYT	140	Anglo-American Oil Co.	300, **600**	P G	—	0.40	—
Cyclops BON	BON	—	Navy	—	O	—	—	—
Cyclops GTF [60]	GTF	90	A. Holt & Co.	300, 450, **600**	P G	X	0.40	4.00
Danube [44]	MBM	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Darro [44]	GGJ	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Dartmouth	BFF	—	Navy	—	O	—	—	—
Dee	BJB	—	Navy	—	O	—	—	—
Defender BJC	BJC	—	Navy	—	O	—	—	—
Defiance BOQ	BOQ	—	Navy	—	O	—	—	—
Delaware GGK [44]	GGK	150	Anglo-American Oil Co.	300, **600**	P G	X	0.40	—
Delphic [44]	GDS	250	White Star Line	300, **600**	P G	X	0.40	—
Delta [44]	MKG	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Demerara [44]	GGN	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Demosthenes [44]	MGK	250	Aberdeen Line (G. Thompson & Co.)	300, **600**	P G	X	0.40	—
Denbigh Hall [44]	GOW	150	Hall Line	300, **600**	P G	X	0.40	—
Denbighshire [44]	MPG	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Denis [44]	MDE	250	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Derbyshire [44]	MYB	250	Bibby Bros. & Co.	300, **600**	P G	X	0.40	—
Derwent BJD	BJD	—	Navy	—	O	—	—	—

Devonian [44]	MDL	250	F. Leyland & Co.	300, 600	P G ..	N	0.40	—
Devonshire	BDK	—	Navy	—	O	—	—	—
Diadem	BEK	—	Navy	—	O	—	—	—
Diamond	BGP	—	Navy	—	O	—	—	—
Diana BFG	BFG	—	Navy	—	O	—	—	—
Dido	BFH	—	Navy	—	O	—	—	—
Dieppe [80]	MRL	80	L.B. & S.C. Railway Co.	300, 600	P G ..	N	0.15 [50]	1.50 [50]
Digby [44]	MNG	250	Furness Withy & Co.	300, 600	P G ..	X	0.40	—
Diligence	BSD	—	Navy	—	O	—	—	—
Dilwara [44]	GCF	200	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Dominion BAT	BAT	—	Navy	—	O	—	—	—
Donegal BDL	BDL	—	Navy	—	O	—	—	—
Donegal GPO [80]	GPO	150	Midland Railway Co.	300, 400, 600 [46]	P R [48] ..	N	0.05	0.50
Dongola [44]	MNH	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G ..	N	0.40	—
Doon	BJE	—	Navy	—	O	—	—	—
Doris BFI	BFI	—	Navy	—	O	—	—	—
Dorington Court [44]	MWR	145	Cressington S.S. Co. (Haldin & Co.)	—	—	—	0.40	—
Dorset [94]	GRY	320	Potter, Trinder & Gwyn	300, 450, 600	P G ..	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Dove	BLF	—	Navy	—	O	—	—	—
Dover Castle [44]	MQM	250	Union Castle	300, 600	P G ..	N	0.40	—
Drake	BDM	—	Navy	—	O	—	—	—
Dreadnought	BAU	—	Navy	—	O	—	—	—
Drina [44]	GGO	250	Royal Mail Steam Packet Co. ..	300, 600	P G ..	N	0.40	—
Druid BJG	BJG	—	Navy	—	O	—	—	—
Drumcliffe [44]	GOS	250	J. Chadwick & Sons	300, 600	P G ..	X	0.40	—
Dublin	BFJ	—	Navy	—	O	—	—	—
Duchess of Devonshire [80] ..	GPP	150	Midland Railway Co.	300, 400, 600	P G ..	N	0.05	0.50
Duendes [44]	GGP	250	Pacific Steam Nav. Co.	300, 600	P G ..	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Duke of Edinburgh	BDN	—	Navy	—	O	—	—	—
Duncan BAV	BAV	—	Navy	—	O	—	—	—
Dunera [44]	GCU	200	British India Steam Nav. Co.	300, 600	P G ..	X	0.40	—
Dunluce Castle [44]	MQO	250	Union Castle	300, 600	P G ..	N	0.40	—
Dunvegan Castle [44]	MPQ	250	Union Castle	300, 600	P G ..	N	0.40	—
Durham [80]	GQC	300	Federal Steam Nav. Co.	300, 600	P G ..	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Durham Castle [44]	MQN	250	Union Castle	300, 600	P G ..	N	0.40	—
Dwarf	BUT	—	Navy	—	O	—	—	—
East Point [44]	GHJ	250	Norfolk & North American S.S. Co.	300, 600	P G ..	X	0.40	—
Ebro [44]	MTJ	210	Royal Mail Steam Packet Co. ..	300, 600	P G ..	N	0.40	—
Eclipse	BFK	—	Navy	—	O	—	—	—
Edavana [44]	GGQ	250	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Eden	BJH	—	Navy	—	O	—	—	—
Edgar	BEL	—	Navy	—	O	—	—	—
Edinburgh Castle [44]	MQE	250	Union Castle	300, 600	P G ..	N	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Egba [44]	GRO	200	Elder Dempster	—	P G	—	0,40	—
Egra [44]	GGR	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Egypt [44]	MMG	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Eileen [4 44]	GAN	200	S. B. Joel	300, **600**	P G	X	0.40	—
Ekma [44]	GGS	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
El Cordobes [44]	MHO	250	British & Argentine Steam Nav. Co.	300, **600**	P G	X	0.40	—
Electra [80 123]	MEE	140	Eastern Telegraph Co.	300, 450, **600**	P	—	0.40	—
Elephanta [44]	GGU	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Ellenga [44]	GGV	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Ellora [44]	GGW	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Elmina [44]	MZI	250	Elder Dempster	300, **600**	P G	X	0.40	—
El Paraguayo [44]	GGY	250	Houlder Line	300, **600**	P G	X	0.40	—
El Toro MHD [44]	MHD	250	Lobitos Oilfields, Ltd. (C. T. Bowring & Co.)	300, **600**	P G	X	0.40	—
El Uruguayo [44]	GGZ	250	British & Argentine Steam Nav. Co.	300, **600**	P G	X	0.40	—
Elysia [44]	MRH	250	Anchor Line	300, **600**	P G	X	0.40	—
Emperor of India	BAS	—	Navy	—	O	—	—	—
Empress [80]	GUI	50	South Eastern & Chatham Railway	300, **600**	P G	N	0.15 [50]	1.50 [50]
Empress of Asia [52]	GKR	250	Canadian Pacific Railway Co.	300, **600**	P G	X	0.40	—
Empress of Britain [44]	MPB	250	Canadian Pacific Railway Co.	300, **600**	P G	N	0.40	—
Empress of India, [52]	MPI	250	Canadian Pacific Railway Co.	300, **600**	P G	X	0.40	—
Empress of Japan [53]	MPJ	250	Canadian Pacific Railway Co.	300, **600**	P G	X	0.40	—
Empress of Russia [52]	MRD	250	Canadian Pacific Railway Co.	300, **600**	P G	X	0.40	—
Enchantress [4]	BQG	—	Navy	—	O	—	—	—
Endeavour	BPL	—	Navy	—	O	—	—	—
Endymion	BEM	—	Navy	—	O	—	—	—
Engadine [80]	GUK	50	South Eastern & Chatham Railway	300, **600**	P G	N	0.15	1.50
Engineer [44]	MFO	250	T. & J. Harrison	300, **600**	P G	X	0.40	—
Erinpura [44]	MVJ	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Escalona [44]	GPZ	150	British & Chilian S.S. Co.	300, **600**	P G	X	0.40	—
Esmeraldas [44]	GHF	250	Pacific Steam Nav. Co.	300, **800**	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Espiegle	BQD	—	Navy	—	O	—	—	—
Essequibo [44]	MTK	210	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—

				300, 600	P G ..	9 a.m. to 12.30 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Etonian [44]	MFD	250	F. Leyland & Co.	300, 600	P G ..	N	0.40	—
Ettrick	BJJ	—	Navy	—	O	—	—	—
Eupion [54]	MKT	150	Eupion S.S. Co.	300, 600	P G ..	X	0.40	—
Euripides [44]	MSE	250	Aberdeen Line (G. Thompson & Co.)	300, 600	P G ..	X	0.40	—
Europa BEN	BEN	—	Navy	—	O	—	—	—
Euryalus BDP..	BDP	—	Navy	—	O	—	—	—
Euryalus GCZ [44]	GCZ	180	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Exe	BJK	—	Navy	—	O	—	—	—
Exmouth	BAX	—	Navy	—	O	—	—	—
Exmouth II. [24 80]	GYF	150	Metropolitan Asylums Board ..	300, 600	P	X	0.40	—
Explorer MVV [44]	MVV	160	T. & J. Harrison	300, 600	P G ..	—	0.40	—
Express..	BLN	—	Navy	—	O	—	—	—
Falcon	BLT	—	Navy	—	O	—	—	—
Faraday [80 122]	GTP	290	Siemens Bros. & Co.	300, 450, 600	P G ..	X	0.40	—
Fazilka [44]	GDA	200	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Fearless..	BHJ	—	Navy	—	O	—	—	—
Ferret	BJL	—	Navy	—	O	—	—	—
Filey [44]	MGY	100	Hull Steam Fishing & Ice Co. ..	300, 600	P	X	0.05 [89]	0,50 [89]
Firedrake	BJM	—	Navy	—	O	—	—	—
Flora	BFN	—	Navy	—	O	—	—	—
Florizel [54]	MZL	250	N.Y., Newfoundland & Halifax S.S. Co. (C. T. Bowring & Co.)	300, 600	P G ..	N	0.40	—
Foresight	BHM	—	Navy	—	O	—	—	—
Forester	BJO	—	Navy	—	O	—	—	—
Forte	BFO	—	Navy	—	O	—	—	—
Forth	BPF	—	Navy	—	O	—	—	—
Forward	BHN	—	Navy	—	O	—	—	—
Fox BFP	BFP	—	Navy	—	O	—	—	—
Foxhound	BJQ	—	Navy	—	O	—	—	—
Foyle	BJR	—	Navy	—	O	—	—	—
Francis [44]	MDG	250	Booth S.S. Co.	300, 600	P G ..	X	0.40	—
Francisco [44]	GHI	250	T. Wilson, Sons & Co.	300, 600	P G ..	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Fremona [44]	GSN	150	Cairn Line	—	P G ..	—	0.40	—
Fultala [44]	GDC	200	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Fury	BJS	—	Navy	—	O	—	—	—
Gaika [44]	MQU	250	Union Castle	300, 600	P G ..	N	0.40	—
Galatea BGO	BGO	—	Navy	—	O	—	—	—
Galicia [44]	GIG	250	Pacific Steam Nav. Co.	300, 600	P G ..	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Galileo [44]	GII	250	T. Wilson, Sons & Co.	300, 600	P G ..	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Galtee More [80]	GUU	250	London and North-Western Railway Co.	300, 600	P G ..	N.	0.05	0.50
Galway Castle [44]	MPY	250	Union Castle	300, 600	P G ..	N	0.40	—
Ganges [75]	GWJ	115	James Nourse, Ltd.	300, 600	P G ..	X	0.40	—
Garland..	BJT	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Garry	BJU	—	Navy	—	O	—	—	—
Garth Castle [44]	MQP	250	Union Castle	300, **600**	P G	N	0.40	—
Gascon [44]	MQV	250	Union Castle	300, **600**	P G	N	0.40	—
Genesee [44]	MIT	150	Anglo-American Oil Co.	300, **600**	P G	X	0.40	—
Georgian MFI [44]	MFI	250	F. Leyland & Co.	300, **600**	P G	N	0.40	—
Ghurka	BJV	—	Navy	—	O	—	—	—
Gibraltar	BEO	—	Navy	—	O	—	—	—
Gipsy	BLW	—	Navy	—	O	—	—	—
Glasgow	BFQ	—	Navy	—	O	—	—	—
Glenart Castle [44]	MQT	250	Union Castle	300, **600**	P G	N	0.40	—
Glenetive [44]	MEZ	250	Caledonia S.S. Co. (J. Gardiner & Co.)	300, **600**	P G	N	0.40	—
Glengorm Castle [44]	MQS	250	Union Castle	300, **600**	P G	N	0.40	—
Gleniffer [44]	MUE	200	Glen Line (McGregor, Gow & Co.)	300, **600**	P G	X	0.40	—
Glenlochy [75]	GWN	120	Glen Line (McGregor, Gow & Co.)	300, **600**	P	X	—	—
Glenlogan [44]	MUF	130	Glen Line (McGregor, Gow & Co.)	300, **600**	P G	X	0.40	—
Glenshiel [44]	YZC	150	S.S. Gairloch Co. (J. Gardiner & Co.)	300, **600**	P G	—	0.40	—
Glory	BAZ	—	Navy	—	O	—	—	—
Gloucester BFR	BFR	—	Navy	—	O	—	—	—
Gloucester Castle [44]	MQZ	250	Union Castle	300, **600**	P G	N	0.40	—
Gloucestershire [44]	MYG	250	Bibby Bros. & Co.	300, **600**	P G	X	0.40	—
Goldfinch	BJW	—	Navy	—	O	—	—	—
Goorkha [44]	MQW	250	Union Castle	300, **600**	P G	N	0.40	—
Goshawk	BJX	—	Navy	—	O	—	—	—
Gracchus [44]	GDF	180	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Grafton	BEP	—	Navy	—	O	—	—	—
Grampian [44]	MRN	250	Allan Line	300, **600**	P G	N	0.40	—
Grampus	BUE	—	Navy	—	O	—	—	—
Grantully Castle [44]	MOQ	250	Union Castle	300, **600**	P G	N	0.40	—
Grasshopper	BJY	—	Navy	—	O	—	—	—
Great City [44]	MKW	250	Great City S.S. Co. (W. R. Smith & Son)	300, **600**	P G	X	0.40	—
Greenore [80]	GUS	250	London & North-Western Railway Co.	300, **600**	P G	N	0.05	0.50
Greyhound	BJZ	—	Navy	—	O	—	—	—
Gr[illegible]fon	BMA	—	Navy	—	O	—	—	—
[illegible]	[illegible]	[illegible]	[illegible]ral Steam Nav. Co., Ltd	300, **600**	P G	X	0.40	—

Guatemala [44]	MWM	250	Pacific Steam Nav. Co. (S.S. Division)	300, 600	P G ..	N	0.40	—
Guildford Castle [44]	MPZ	250	Union Casle	300, 600	P G ..	N	0.40	—
Gujarat [44]	GBO	250	A. Weir & Co.	300, 600	P G ..	N	0.40	—
Halcyon BPS	BPS	—	Navy	—	O	—	—	—
Hannibal BBC	BBC	—	Navy	—	O	—	—	—
Hantonia [44]	GIL	250	London & South-Western Railway	300, 600	P G ..	N	0.15	1.50
Hardy	BKA	—	Navy	—	O	—	—	—
Harpy	BKB	—	Navy	—	O	—	—	—
Harrier	BQY	—	Navy	—	O	—	—	—
Haverford [44]	MJH	250	American Line	300, 600	P G ..	N	0.40	—
Hazard	BOW	—	Navy	—	O	—	—	—
Hearty	BSE	—	Navy	—	O	—	—	—
Hebe	BOX	—	Navy	—	O	—	—	—
Hecla	BOS	—	Navy	—	O	—	—	—
Henzada [75]	GWD	180	British and Burmese Steam Nav. Co.	300, 600	P G ..	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Hercules BBD	BBD	—	Navy	—	O	—	—	—
Herefordshire [44]	MYA	250	Bibby Bros. & Co...	300, 600	P G ..	X	0.40	—
Hermione BFT	BFT	—	Navy	—	O	—	—	—
Hermione GIN [44]	GIN	250	British & S. American Steam Nav. Co. (R. P. Houston & Co.)	300, 600	P G ..	X	0.40	—
Herschel [44]	MUA	180	Lamport & Holt	300, 600	P G ..	X	0.40	—
Hesperides GIO [44]	GIO	250	British & S. American Steam Nav. Co. (R. P. Houston & Co.)	300, 600	P G ..	X	0.40	—
Hibernia BBE	BBE	—	Navy	—	O	—	—	—
Highflyer	BFU	—	Navy	—	O	—	—	—
Highland Brigade [44]	MCZ	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Corrie [44]	GIQ	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Enterprise [44] ..	MDA	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Glen [44]	GIR	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Harris [44]	MDO	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Heather [44]	MEK	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Laddie [44]	GIU	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Laird [44]	MEP	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Loch [44]	GIY	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Piper [44]	GNM	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Pride [44]	GJA	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Rover [44]	GJB	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Scot [44]	GJC	250	Nelson Line	300, 600	P G ..	X	0.40	—
Highland Watch [44]	MER	250	Nelson Line	300, 600	P G ..	X	0.40	—
Hilary [44]	MDP	250	Booth S.S. Co.	300, 600	P G ..	X	0.40	—
Hildebrand MDM [44]	MDM	250	Booth S.S. Co.	300, 600	P G ..	X	0.40	—
Himalaya [44]	MNY	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G ..	X	0.40	—
Hind	BKF	—	Navy	—	O	—	—	—
Hindustan	BBF	—	Navy	—	O	—	—	—
Historian [44]	MHT	250	T. & J. Harrison	300, 600	P G ..	X	0.40	—
Holbein [44]	MUB	180	Lamport & Holt	300, 600	P G ..	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Homer City [44]	GAB	160	Great City S.S. Co. (W. R. Smith & Son)	300, **600**	P G	X	0.40	—
Honorius [44]	GJE	250	British & South American Steam Nav. Co. (R. P. Houston & Co.	300, **600**	P G	X	0.40	—
Hope	BKG	—	Navy	—	O	—	—	—
Hornet	BKH	—	Navy	—	O	—	—	—
Hororata [79]	MRF	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Huanchaco [44]	GJF	250	Pacific Steam Nav. Co.	300, **600**	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Huayna [44]	MDV	250	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Hubert [44]	MVI	250	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Huntsman [44]	GLB	250	T. & J. Harrison	300, **600**	P G	X	0.40	—
Hurunui [79]	GCQ	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Hussar	BPT	—	Navy	—	O	—	—	—
Hyacinth	BFV	—	Navy	—	O	—	—	—
Hyacinthus [44]	GJG	250	British & South American Steam Nav. Co. (R. P. Houston & Co.)	300, **600**	P G	X	0.40	—
Hydaspes [44]	GJH	250	British & South American Steam Nav. Co. (R. P. Houston & Co.)	300, **600**	P G	X	0.40	—
Hydra BKJ	BKJ	—	Navy	—	O	—	—	—
Hymettus [44]	GEF	180	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Hypatia [44]	GJI	250	British & South American Steam Nav. Co. (R. P. Houston & Co.)	300, **600**	P G	X	0.40	—
Ibex [80]	MSC	120	Great Western Railway Co.	300. **600**	P G	N	0.05	0.50
Idaho [44]	GJJ	250	T. Wilson, Sons & Co.	300, **600**	P G	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Illustrious	BBG	—	Navy	—	O	—	—	—
Implacable	BBH	—	Navy	—	O	—	—	—
Inanda [44]	MID	250	T. & J. Harrison	300, **600**	P G	N	0.40	—
Inca [44]	MIF	250	Pacific Steam Navigation Co.	300, **600**	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Inconstant	BGW	—	Navy	—	O	—	—	—
Indian [44]	MHB	250	F. Leyland & Co.	300, **600**	P G	N	0.40	—
Indomitable	BCP	—	Navy	—	O	—	—	—
Indore [44]	GMI	250	Gulf Transport Co. (J. H. Welsford & Co.)	300, **600**	P G	X	0.40	—
[illegible]	BCO	—	Navy	—	O	—	—	—

[illegible]	[illegible]	250	T. & J. Harrison	300, 600	P G	N	0.40	—
[illegible]	[illegible]	250	T. & J. Harrison	300, 600	P G	N	0.40	—
Intrepid BPG	BPG	—	Navy	—	O	—	—	—
Inventor [44]	MVY	—	T. & J. Harrison	300, 600	P G	—	0.40	—
Invicta [80]	GUL	50	South Eastern & Chatham Railway	300, 600	P G	N	0.15 [80]	1.50 [80]
Ionian [44]	MIN	250	Allan Line	300, 600	P G	N	0.40	—
Ionic [44]	MWI	250	White Star Line	300, 600	P G	X	0.40	—
Iphigenia	BQT	—	Navy	—	O	—	—	—
Iris [80 122]	MNI	—	Pacific Cable Board	—	—	—	—	—
Irishman [44]	GJK	250	Dominion Line	300, 600	P G	X	0.40	—
Iron Duke	BBI	—	Navy	—	O	—	—	—
Iroquois MEI [44]	MEI	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Isis BFW	BFW	—	Navy	—	O	—	—	—
Isis GAP [44]	GAP	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Ismaila [44]	GFB	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Italia MAR [44]	MAR	250	Anchor Line	300 600	P G	N	0.40	—
Itchen	BKK	—	Navy	—	O	—	—	—
Itola [44]	GFD	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Itria [44]	GGA	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Ixion [80]	GRZ	90	A. Holt & Co.	300, 450, 600	P G	X	0.40	4.00
Jabberwock [80 91]	GNN	10	H. Merton, London	150, 300	P	—	—	—
Jackal	BKM	—	Navy	—	O	—	—	—
Janus [44]	GHB	180	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Jason BPU	BPU	—	Navy	—	O	—	—	—
Jed	BKN	—	Navy	—	O	—	—	—
John Pender [80 122]	MEF	140	Eastern Telegraph Co.	300, 450, 600	P	—	0.40	—
Jose de Larrinaga [44]	GAU	250	Miguel de Larrinaga S.S. Co.	300, 600	P G	X	0.40	—
Junin [44]	GJL	250	Pacific Steam Nav. Co.	300, 600	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Juno BFX [44]	BFX	—	Navy	—	O	—	—	—
Jupiter BBK	BBK	—	Navy	—	O	—	—	—
Kabinga [44]	GEI	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kafue [44]	MRT	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kaikoura [79]	MRS	250	New Zealand Shipping Co.	300, 600	P G	X	0.40	—
Kaisar-I-Hind [44]	MSI	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Kale	BKO	—	Navy	—	O	—	—	—
Kalomo [44]	GBY	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kanawha MNL [44]	MNL	250	Furness Withy & Co.	300, 600	P G	X	0.40	—
Kandahar [4]	MAB	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kangaroo	BMF	—	Navy	—	O	—	—	—
Kansas MRW [44]	MRW	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Karamea [44]	MSB	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Karema [44]	MAF	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Karina MZJ [44]	MZJ	250	Elder Dempster	300, 600	P G	X	0.40	—
Karmala [44]	MTF	200	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Karonga [44]	GEJ	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Karroo [44]	GNS	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kasama [44]	GBP	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kasenga [44]	GEK	150	Ellerman & Bucknall S.S. Co.	300, 600	P G	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Kashgar [44]	YYL	180	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	—	0.40	—
Kashmir [44]	—	180	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	—	0.40	—
Katharine Park [80]	GRU	140	Park S.S. Co.	—	—	—	—	—
Kathiawar [44]	GEM	250	A. Weir & Co.	300, 600	P G	N	0.40	—
Kathlamba [44]	GLF	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Katuna [44]	GEH	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kazembe [44]	GYQ	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Keelung [44]	MFP	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kenilworth Castle [44]	MQF	250	Union Castle	300, 600	P G	N	0.40	—
Kennet	BKP	—	Navy	—	O	—	—	—
Kent BDT	BDT	—	Navy	—	O	—	—	—
Kentucky GDN [44]	GDN	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Kenuta [44]	GJO	250	Pacific Steam Nav. Co.	300, 600	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Khiva [44]	MGZ	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Khyber [44]	MCE	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Kia Ora [44]	GJP	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Kildonan Castle [44]	MQK	250	Union Castle	300, 600	P G	N	0.40	—
Kinfauns Castle [44]	MQL	250	Union Castle	300, 600	P G	N	0.40	—
King Alfred	BDU	—	Navy	—	O	—	—	—
King George V.	BBM	—	Navy	—	O	—	—	—
King Orry [44]	MPE	100	Isle of Man Steam Packet Co.	300, 600	P G	N	0.05	0.50
Kingstonian [44]	MHM	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Kinsha	BSG	—	Navy	—	O	—	—	—
Kioto [44]	GEZ	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Knight Companion [44]	GKS	250	Knight S.S. Co. (Greenshields, Cowie & Co.)	300, 600	P G	X	0.40	—
Knight of the Garter [44]	MSQ	250	Knight S.S. Co. (Greenshields, Cowie & Co.)	300, 600	P G	X	0.40	—
Knight of the Thistle [44]	GMG	250	Knight S.S. Co. (Greenshields, Cowie & Co.)	300, 600	P G	X	0.40	—
Knight Templar [44]	GKT	250	Knight S.S. Co. (Greenshields,	300, 600	P G	X	0.40	—

[illegible]	MFG	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Kumeric [44]	GJQ	250	Andrew Weir & Co.	300, 600	P G	X	0.40	—
La Blanca [44]	GJR	250	Argentine Cargo Line	300, 600	P G	X	0.40	—
Lackawanna GJV [44]	GJV	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Lady Brassey [80 114]	GQS	90	Dover Harbour Board	150, 300	P	X	—	—
Lady Crundall [80 114]	GQR	90	Dover Harbour Board	150, 300	P	X	—	—
Laertes	BMG	—	Navy	—	O	—	—	—
Laforey	BMH	—	Navy	—	O	—	—	—
Lake Manitoba [44]	MLM	150	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Lake Michigan [44]	MLH	150	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Lakonia [44]	GPW	—	Donaldson Bros.	300, 600	P G	—	0.40	—
Lama [44]	GJN	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
La Marguerite [44]	GJU	250	Liverpool & North Wales S.S. Co.	300 600	P G	N	0.05	0.50
Lancaster BDV	BDV	—	Navy	—	O	—	—	—
Lancastrian [44]	MBP	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Lance	BMM	—	Navy	—	O	—	—	—
Landrail	BMZ	—	Navy	—	O	—	—	—
La Negra [44]	MTI	250	British & Argentine Steam Nav. Co.	300, 600	P G	X	0.40	—
Lanfranc [44]	MDS	250	Booth S.S. Co.	300, 600	P G	X	0.40	—
Lapland [44]	YYE	150·200	American Line	300, 450, 600	P G	N	0.40	—
Lapwing	BKQ	—	Navy	—	O	—	—	—
Lark	BNE	—	Navy	—	O	—	—	—
Larne	BKR	—	Navy	—	O	—	—	—
La Rosarina [44]	GJW	250	British & Argentine Steam Nav. Co.	300, 600	P G	X	0.40	—
Latona	BQU	—	Navy	—	O	—	—	—
Laurel	BNM	—	Navy	—	O	—	—	—
Laverock	BNP	—	Navy	—	O	—	—	—
Lawford	BOJ	—	Navy	—	O	—	—	—
Leander	BOT	—	Navy	—	O	—	—	—
Leda BPV	BPV	—	Navy	—	O	—	—	—
Legion	BQJ	—	Navy	—	O	—	—	—
Leicestershire [44]	MYL	250	Bibby Bros. & Co.	300, 600	P G	X	0.40	—
Leinster [44]	MCV	140	City of Dublin Steam Packet Co.	300, 600	P G	N	0.05	0.50
Lennox	BQZ	—	Navy	—	O	—	—	—
Leonidas BRA	BRA	—	Navy	—	O	—	—	—
Leopard	BRB	—	Navy	—	O	—	—	—
Letitia [44]	GKA	250	Donaldson Bros.	300, 600	P G	N	0.40	—
Levant [80 122]	GJY	110	Eastern Telegraph Co.	300, 450, 600	P	—	0.40	—
Leviathan	BDW	—	Navy	—	O	—	—	—
Lhasa [44]	GKF	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Liberty BRC	BRC	—	Navy	—	O	—	—	—
Liffey	BKS	—	Navy	—	O	—	—	—
Limerick [81]	MVM	250	Union S.S. Co. of New Zealand	300, 600	P G	X	0.40	—
Linga [44]	GLJ	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Linnet BRD	BRD	—	Navy	—	O	—	—	—
Linnet MKI [80]	MKI	150	Liverpool Salvage Association	300, 600	P	X	0.05[89]	0.50[89]

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Ship Stations—*Continued*

Name	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Lion	BCS	—	Navy	—	O	—	—	—
Lively	BRE	—	Navy	—	O	—	—	—
Liverpool	BFY	—	Navy	—	O	—	—	—
Lizard	BKT	—	Navy	—	O	—	—	—
Llandovery Castle [44]	MCO	250	Union Castle	300, **600**	P G	N	0.40	—
Llanstephan Castle [44]	MJT	250	Union Castle	300, **600**	P G	N	0.40	—
Llewellyn	BRF	—	Navy	—	O	—	—	—
Locust	BRG	—	Navy	—	O	—	—	—
London	BBN	—	Navy	—	O	—	—	—
Londonderry [80]	GPR	150	Midland Railway Co.	300, 400, **600** [46]	P R [48]	N	0.05	0.50
Lookout	BRH	—	Navy	—	O	—	—	—
Lord Nelson	BBO	—	Navy	—	O	—	—	—
Lowestoft	BFZ	—	Navy	—	O	—	—	—
Loyal	BRJ	—	Navy	—	O	—	—	—
Lucifer	BRK	—	Navy	—	O	—	—	—
Lunka [44]	GLM	140	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Lurcher	BKU	—	Navy	—	O	—	—	—
Lydiard	BRL	—	Navy	—	O	—	—	—
Lyra	BKW	—	Navy	—	O	—	—	—
Lysander	BRM	—	Navy	—	O	—	—	—
Macedonia MML [44]	MML	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Mackay-Bennett [80, 122]	MMB	250	Commercial Cable Co.	300, **600**	P	X	—	—
Madras [44]	MSH	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Magdalena [44]	GUC	250	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Magellan MIH [44]	MIH	250	Pacific Steam Navigation Co.	300, **600**	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Magnet MEH [80, 122]	MEH	140	Eastern Extension Australasia & China Telegraph Co.	300, **600**	P	—	0.40	—
Magnificent	BBP	—	Navy	—	O	—	—	—
Mahanada [75]	GVJ	130	T. & J. Brocklebank	300, **600**	P G	X	—	—
Maidan [75]	GVN	130	T. & J. Brocklebank	300, **600**	P G	X	—	—
Maidstone	BOY	—	Navy	—	O	—	—	—
Maine BQK	BQK	—	Navy	—	O	—	—	—
Malakuta [75]	GVI	130	T. & J. Brocklebank	300, **600**	P G	X	—	—
Malda [44]	GIS	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Malta [44]	GKD	250	Peninsular & Oriental Steam Nav.	300, **600**	P G	X	0.40	—
Malwa [44]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	0.40	—
Mamari [44]	GKH	250	Manchester Liners	300, 600	P G	7 a.m. to 11 p.m.	0.40	—
Manchester Corporation [44]	YYB	140	Manchester Liners	300, 600	P G	—	0.40	—
Mandalay [75]	GWP	180	British and Burmese Steam Nav. Co.	300, 600	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Manhattan [44]	GKK	250	Atlantic Transport Line	300, 600	P G	N	0.40	—
Manistee [44]	MLR	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Manitou MNM [44]	MNM	250	Atlantic Transport Line	300, 600	P G	N	0.40	—
Manly	BUF	—	Navy	—	O ..	—	—	—
Manora [44]	GIT	250	British India Steam Nav. Co	300, 600	P G	X	0.40	—
Mansfield	BUG	—	Navy	—	O ..	—	—	—
Mantua [44]	MME	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40 [19]	— [49]
Manxman GPS [80]	GPS	150	Midland Railway Co.	300, 400, 600	P G	N	0.05	0.50
Manzanares [44]	MLS	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Marathon [44]	MGJ	250	Aberdeen Line (G. Thompson & Co.)	300, 600	P G	X	0.40	—
Marengo [44]	GKJ	250	T. Wilson, Sons & Co.	300, 600	P G	8 a.m. to 1 p.m., 2 p.m. to 5 p.m., 6 p.m. to 10 p.m.	0.40	—
Marlborough	BBR	—	Navy	—	O ..	—	—	—
Marmora [44]	MMR	250	Peninsular & Orienta Steam Nav. Co.	300, 600	P G	X	0.40	—
Mars BBS	BBS	—	Navy	—	O ..	—	—	—
Martaban [75]	GWC	140	British and Burmese Steam Nav. Co.	300, 600	P G	10 a.m. to midday, 2 p.m. to 4 p.m.. 8 p.m. to midnight	0.40	—
Martin	BKY	—	Navy	—	O ..	—	—	—
Maryland MBW [44]	MBW	250	Atlantic Transport Line	300, 600	P G	X	0.40	—
Masconomo [92]	GTR	125	Tank Storage & Carriage Co.	300, 600	P ..	X	—	—
Mashobra [44]	GMS	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Massasoit GTB [92]	GTB	125	Tank Storage & Carriage Co.	300, 600	P ..	X	—	—
Massilia [44]	MHQ	250	Anchor Line	300, 600	P G	X	0.40	—
Mastiff	BUI	—	Navy	—	O ..	—	—	—
Matatua [44]	GKL	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Matchless	BUJ	—	Navy	—	O ..	—	—	—
Matheran [75]	GVO	130	T. & J. Brocklebank	300, 600	P G	X	—	—
Matiana [44]	MYZ	200	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Matina [44]	MLT	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Matoppo [44]	MAM	150	Ellerman and Bucknall S.S. Co.	300, 600	P G	X	0.40	—
Matura [54]	GYD	250	Trinidad Shipping & Trading Co.	300, 600	P G	N	0.40	—
Mauretania [44]	MGA	250	Cunard Line	110, 300, 600	P G	N	0.40	—
Mayaro [54]	MFR	250	Trinidad Shipping & Trading Co.	300, 600	P G	N	0.40	—
Mechanician [44]	GCG	250	T. & J. Harrison	300, 600	P G	X	0.40	—
Medic [44]	MKK	250	White Star Line	300, 600	P G	X	0.40	—
Medina MKP [44]	MKP	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	N	0.40	—
Megantic [44]	MZC	250	White Star Line	300, 600	P G	N	0.40	—
Mekong [75]	GSV	270	V. Morton-Jackson, Clonmel, Ireland	300, 450, 600	P ..	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Melania [44]	MPP	250	Anglo-Saxon Petroleum Co.	300, **600**	P G	X	0.40	—
Melford Hall [44]	GEQ	150	Hall Line	300, **600**	P G	X	0.40	—
Mendi [44]	MZM	250	Elder Dempster	300, **600**	P G	X	0.40	—
Menominee [44]	MNE	250	Atlantic Transport Line	300, **600**	P G	N	0.40	—
Mentor	BUL	—	Navy	—	O	—	—	—
Mercedes BQN	BQN	—	Navy	—	O	—	—	—
Merion [44]	MJM	250	American Line	300, **600**	P G	N	0.40	—
Merkara [44]	GMY	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Mermaid	BKZ	—	Navy	—	O	—	—	—
Mersey [24] [80]	MWJ	135	White Star Line	300, **600**	P G	X	0.40	—
Mesaba [44]	MMV	250	Atlantic Transport Line	300, **600**	P G	N	0.40	—
Meteor BRN	BRN	—	Navy	—	O	—	—	—
Mexico MWG [44]	MWG	250	Pacific Steam Nav. Co.	300, **600**	P G	N	0.40	—
Miami MLU [44]	MLU	150	Elders & Fyffes	300, **600**	P G	X	0.40	—
Michael [75]	GWV	225	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Michigan GKM [44]	GKM	250	Atlantic Transport Line	300, **600**	P G	N	0.40	—
Middlesex [44]	MRE	250	Federal Steam Nav. Co.	300, **600**	P G	X	0.40	—
Midge	BLA	—	Navy	—	O	—	—	—
Milne	BUM	—	Navy	—	O	—	—	—
Miltiades [44]	MGF	250	Aberdeen Line (G. Thompson & Co.)	300, **600**	P G	X	0.40	—
Milwaukee MLF [44]	MLF	150	Canadian Pacific Railway Co.	300, **600**	P G	X	0.40	—
Minerva BGB	BGB	—	Navy	—	O	—	—	—
Minia [80] [122]	GUQ	150	Anglo-American Telegraph Co.	300, **600**	P	X	—	—
Minnehaha [44]	MMA	250	Atlantic Transport Line	300, **600**	P G	N	0.40	—
Minnetonka [44]	MMK	250	Atlantic Transport Line	300, **600**	P G	N	0.40	—
Minnie de Larrinaga [44]	MLA	250	Miguel de Larrinaga S.S. Co.	300, **600**	P G	X	0.40	—
Minos	BUN	—	Navy	—	O	—	—	—
Minotaur	BDX	—	Navy	—	O	—	—	—
Minstrel	BLB	—	Navy	—	O	—	—	—
Miranda	BRO	—	Navy	—	O	—	—	—
Missanabie [44]	MZQ	220	Canadian Pacific Railway Co.	300, **600**	P G	N	0.40	—
Mississippi GRI [44] [91]	GRI	180	Atlantic Transport Line	300, **600**	P G	—	0.40	—
Missouri MLG [44]	MLG	250	Atlantic Transport Line	300, **600**	P G	X	0.40	—
Mitra [44]	MZH	150	Anglo-Saxon Petroleum Co.	—	P G	—	0.40	—
Mohawk BLC	BLC	—	Navy	—	O	—	—	—
Moldavia [44]	MMH	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—

Mongolia MMJ	MMJ	250	Peninsular & Oriental Steam Nav.	300, 600	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	150	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Monmouthshire [44]	GAM	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Monteagle [52]	MPF	250	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Montfort [44]	MLW	150	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Montreal MLI [44]	MLI	150	Canadian Pacific Railway Co.	300, 600	P G	X	0.40	—
Mooltan [44]	MMM	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Moorhen	BSH	—	Navy	—	O	—	—	—
Moorish Prince [44]	YYK	—	Prince Line	300, 600	P G	—	0.40	—
Morea [44]	MMF	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Morris BUQ	BUQ	—	Navy	—	O	—	—	—
Morvada [44]	MUP	200	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Mosquito	BLD	—	Navy	—	O	—	—	—
Motagua [44]	MPN	250	Elders & Fyffes	300, 600	P G	X	0.40	—
Moy	BLE	—	Navy	—	O	—	—	—
Moyune [44]	YYO	—	A. Holt & Co.	300, 600	P G	—	0.40	—
Munster [44]	MCQ	140	City of Dublin Steam Packet Co.	300, 600	P G	N	0.05	0.50
Murray	BUR	—	Navy	—	O	—	—	—
Musician [44]	MAD	250	T. & J. Harrison	300, 600	P G	X	0.40	—
Mutlah [44]	MOA	150	James Nourse, Ltd	300, 600	P G	X	0.40	—
Myngs	BUS	—	Navy	—	O	—	—	—
Myrmidon	BUD	—	Navy	—	O	—	—	—
Nagoya [45]	GCD	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Naiad	BPH	—	Navy	—	O	—	—	—
Namur [44]	GKN	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Naneric [44]	GKO	250	Andrew Weir & Co.	300, 600	P G	N	0.40	—
Nankin [44]	GKP	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Narragansett [44]	MEC	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Navahoe MEN [24] [44]	MEN	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Nellore [44]	MEW	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Nemesis BLG	BLG	—	Navy	—	O	—	—	—
Nemesis MSM [80]	MSM	150	Lindsay Swan Hunter	300, 600	P	X	—	—
Neptune BBU	BBU	—	Navy	—	O	—	—	—
Nereide	BLH	—	Navy	—	O	—	—	—
Ness	BLI	—	Navy	—	O	—	—	—
Nessian [44]	GPV	—	F. Leyland & Co.	300, 600	P G	X	0.40	—
Nestor [44]	GBQ	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Neuralia [44]	GCV	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Nevasa [44]	GBG	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Newcastle	BGC	—	Navy	—	O	—	—	—
New Zealand	BCT	—	Navy	—	O	—	—	—
Niagara GBE [81]	GBE	250	Union S.S. Co. of New Zealand	300, 600	P G	N	0.40	—
Nigeria [44]	MZF	250	Elder Dempster	300, 600	P G	X	0.40	—
Nightingale	BSI	—	Navy	—	O	—	—	—
Nirvana [44]	MZW	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Nith	BLJ	—	Navy	—	O	—	—	—
Nore [44]	GKV	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Norman [44]	MOM	250	Union Castle	300, **600**	P G	N	0.40	—
Normannia GKW [44]	GKW	250	London & South Western Railway	300, **600**	P G	N	0.15	1.50
Norseman MEG [80 122]	MEG	140	Western Telegraph Co.	300, **600**	P	—	—	—
North Point [44]	GIW	250	Norfolk & North American S.S. Co.	300, **600**	P G	X	0.40	—
Northwestern Miller [44]	MTV	170	Norfolk & North American S.S.Co.	300, **600**	P G	X	0.40	—
Novara GCW [44]	GCW	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Nubian	BLK	—	Navy	—	O	—	—	—
Nyanza [44]	GKY	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Nymphe BLL	BLL	[illegible]	Navy	—	O	—	—	—
Oak	BLM	—	Navy	—	O	—	—	—
Oanfa [44]	—	180	A. Holt & Co.	300, **600**	P G	—	0.40	—
Obra [44]	GML	170	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Obuasi [44]	MDD	150	Elder Dempster	300, **600**	P G	X	0.40	—
Odin BQE	BQE	—	Navy	—	O	—	—	—
Okhla [44]	GNJ	170	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Olympia BQO	BQO	—	Navy	—	O	—	—	—
Olympia MHI [44]	MHI	250	Anchor Line	300, **600**	P G	X	0.40	—
Olympic [44]	MKC	350	White Star Line	300, **600**	P G	N	0.40	—
Omrah [44]	MOK	250	Orient Steam Nav. Co.	300, **600**	P G	X	0.40	—
Onda [44]	GNL	160	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Oneka [92]	GTV	125	Tank Storage & Carriage Co.	300, **600**	P	X	—	—
Onward [80]	GUM	50	South Eastern & Chatham Railway	300, **600**	P G	N	0.15 [50]	1.50 [50]
Oolobaria [44]	GNU	160	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Opawa [79]	MRG	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Ophir GYB [44]	GYB	250	Orient Steam Nav. Co.	300, **600**	P G	X	0.40	—
Orama [44]	MTW	250	Orient Steam Nav. Co.	300, **600**	P G	X	0.40	—
Orari [79]	MRM	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Orbita [44]	MGI	250	Pacific Steam Navigation Co.	300, **600**	P G	N	0.40	—
Orcoma [44]	MJF	250	Pacific Steam Navigation Co.	300, **600**	P G	N	0.40	—
Orduna [44]	MGP	250	Pacific Steam Navigation Co	300, **600**	P G	N	0.40	—
Oriana [44]	MJJ	250	Pacific Steam Navigation Co.	300, **600**	P G	N	0.40	—
Orion BBW	BBW	—	Navy	—	O	—	—	—

[illegible]			... Nav. Co.	300, 600	P G	X	0.40	—
Oropesa [44]	MJA	250	Pacific Steam Navigation Co.	300, 600	P G	N	0.40	—
Orotava [44]	GUD	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Orsova [44]	MOF	250	Orient Steam Nav. Co.	300, 600	P G	X	0.40	—
Ortega [44]	MJK	250	Pacific Steam Navigation Co.	300, 600	P G	N	0.40	—
Orthia [44]	YYT	—	Donaldson Bros	300, 600	P G	—	0.40	—
Ortolan [80]	GQM	90	General Steam Nav. Co.	300, 600	P G	X	0.40	—
Oruba [44]	GUE	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Orvieto [44]	MOJ	250	Orient Steam Nav. Co.	300, 600	P G	X	0.40	—
Orwell	BRP	—	Navy	—	O	—	—	—
Osiris GAQ [44]	GAQ	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Oslo [44]	MWO	250	T. Wilson, Sons & Co.	300, 600	P G	8 a.m. to 1 p.m., 2 p.m. to 7 p.m., 8 p.m. to midnight	0.15 [74]	0.90 [74]
Osprey	BRQ	—	Navy	—	O	—	—	—
Osterley [44]	MOY	250	Orient Steam Nav. Co.	300, 600	P G	X	0.40	—
Otaki [79]	MRP	250	New Zealand Shipping Co.	300, 600	P G	X	0.40	—
Otranto [44]	MOD	250	Orient Steam Nav. Co.	300, 600	P G	X	0.40	—
Ottawa [44]	MIV	150	Anglo-American Oil Co.	300, 600	P G	X	0.40	—
Otway [44]	MOH	250	Orient Steam Nav. Co.	300, 600	P G	X	0.40	—
Ouse	BLO	—	Navy	—	O	—	—	—
Owl	BLP	—	Navy	—	O	—	—	—
Oxfordshire [44]	MYE	250	Bibby Bros & Co.	300, 600	P G	X	0.40	—
Oxonian [44]	MHR	250	F. Leyland & Co.	300, 600	P G	N	0.40	—
Ozarda [44]	GNZ	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Pactolus	BOZ	—	Navy	—	O	—	—	—
Pacuare [44]	MLY	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Pakeha [44]	GLG	250	Shaw Savill & Albion Co.	300, 600	P G	X	0.40	—
Palermo MIL [44]	MIL	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Palma [44]	MKD	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G	X	0.40	—
Panama MWB [44]	MWB	250	Pacific Steam Nav. Co.	300, 600	P G	N	0.40	—
Pancras [44]	MDI	250	Booth S.S. Co.	300, 600	P G	X	0.40	—
Pannonia [44]	MNA	250	Cunard Line	300, 600	P G	N	0.40	—
Panther BLQ	BLQ	—	Navy	—	O	—	—	—
Paparoa [79]	MHY	250	New Zealand S.S. Co.	300, 600	P G	X	0.40	—
Paragon	BLR	—	Navy	—	O	—	—	—
Parana GLK [44]	GLK	150	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Pardo [44]	GLL	150	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Parima [54]	MBK	200	Canada Steamship Lines (Quebec S.S. Division)	300, 600	P G	N	0.40	—
Paris GLC [83]	GLC	120	L.B. & S.C. Railway Co.	300, 600	P G	N	0.15 [50]	1.50 [50]
Parthenia [44]	MNS	250	Donaldson Bros.	300, 600	P G	X	0.40	—
Patella [44]	MZO	150	Anglo-Saxon Petroleum Co.	—	P G	—	0.40	—
Pathan [44]	MPV	150	Mogul S.S. Co. (Gellatly, Hankey & Co.)	300, 600	P G	X	0.40	—
Patia [44]	MVW	250	Elders & Fyffes	300, 600	P G	X	0.40	—
Patrician [44]	MIR	250	T. & J. Harrison	300, 600	P G	X	0.40	—
Patrol BHP	BHP	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Patrol MEM [80, 122]	MEM	140	Eastern Extension Australasia & China Tel. Co.	300, **600**	P	—	0.40	—
Patuca [44]	GDB	250	Elders & Fyffes	300, **600**	P G	X	0.40	—
Pegu [75]	GWM	180	British & Burmese Steam Nav. Co.	300, **600**	P G	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Pelorus	BGT	—	Navy	—	O	—	—	—
Pembrokeshire [44]	MUT	170	Royal Mail Steam Packet Co.	300, **600**	P G	N	0.40	—
Penelope	BJA	—	Navy	—	O	—	—	—
Pera [44]	MGB	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Peregrine [80]	GST	90	General Steam Nav. Co.	300, **600**	P G	X	0.40	—
Perseus	BGU	—	Navy	—	O	—	—	—
Persic [44]	MQC	250	White Star Line	300, **600**	P G	X	0.40	—
Peru GLN [44]	GLN	250	Pacific Steam Nav. Co.	300, **600**	P G	N	0.40	—
Peshawur [44]	MIQ	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Peterel	BRR	—	Navy	—	O	—	—	—
Petroleum	BQM	—	Navy	—	O	—	—	—
Phaeton	BJF	—	Navy	—	O	—	—	—
Philadelphian [44]	MNW	250	F. Leyland & Co.	300, **600**	P G	N	0.40	—
Philomel	BGV	—	Navy	—	O	—	—	—
Phœnix BLS	BLS	—	Navy	—	O	—	—	—
Pincher	BLU	—	Navy	—	O	—	—	—
Plassy [44]	MNJ	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	N	0.40	—
Poleric [44]	GCY	250	Andrew Weir & Co.	300, **600**	P G	N	0.40	—
Politician [44]	MVZ	180	T. & J. Harrison	300, **600**	P G	X	0.40	—
Pomeranian [44]	GLO	250	Allan Line	300, **600**	P G	N	0.40	—
Pomone	BJN	—	Navy	—	O	—	—	—
Ponus [92]	GTT	125	Tank Storage & Carriage Co.	300, **600**	P	X	—	—
Poona [44]	MSO	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Porpoise	BLV	—	Navy	—	O	—	—	—
Port Albany [90]	GWI	260	Commonwealth and Dom. Line	300, **600**	P G	X	0.40	—
Port Kembla [75]	GWF	260	Commonwealth and Dom. Line	300, **600**	P G	X	0.40	—
[illegible]	CTZ	260	Commonwealth and Dom. Line	300, **600**	P G	N	0.40	—
Portuguese Prince [44]	GRS	[illegible]	[illegible]	[illegible]	[illegible]	N	0.40	—

							... p.m. to 2 a.m.		
[illegible]				300, 600	P ..		X	—	—
Powhatan [illegible] ..	[illegible]	250	Allan Line	300, 600	P G	..	N	0.40	—
Prince George BBX	BBX	—	Navy	—	O ..	..	—	—	—
Prince George GLR [80] ..	GLR	150	Grand Trunk Pacific Development Co.	300, 600	P G	..	N	0.40	4.00
Prince of Wales	BBY	—	Navy	—	O ..	..	—	—	—
Prince Rupert [80]	GLS	150	Grand Trunk Pacific Development Co.	300, 600	P G	..	N	0.40	4.00
Princess Royal BCU	BCU	—	Navy	—	O ..	..	—	—	—
Princess Victoria [52]	MCM	250	Canadian Pacific Railway Co. ..	300, 600	P G	..	N	0.40 [55]	4.00 [55]
Proserpine	BGY	—	Navy	—	O ..	..	—	—	—
Protesilaus [80]	GSC	90	A. Holt & Co.	300, 450, 600	P G	..	X	0.40	4.00
Psyche	BGZ	—	Navy	—	O ..	..	—	—	—
Pyramus	BHA	—	Navy	—	O ..	..	—	—	—
Quail	BRS	—	Navy	—	O ..	..	—	—	—
Queda [44]	GOA	140	British India Steam Nav. Co. ..	300, 600	P G	..	X	0.40	—
Queen BBZ	BBZ	—	Navy	—	O ..	..	—	—	—
Queen Elizabeth	BCA	—	Navy	—	O ..	..	—	—	—
Querimba [44]	GOB	140	British India Steam Nav. Co. ..	300, 600	P G	..	X	0.40	—
Quernmore [44]	GYT	250	Johnston Line (Furness, Withy & Co.	300, 600	P G	..	X	0.40	—
Quillota [44]	MWK	250	Pacific Steam Nav. Co.	300, 600	P G	..	N	0.40	—
Quiloa [44]	GOC	140	British India Steam Nav. Co. ..	300, 600	P G	..	X	0.40	—
Quilpue [44]	GLT	250	Pacific Steam Nav. Co.	300, 600	P G	..	N	0.40	—
Racehorse	BLX	—	Navy	—	O ..	..	—	—	—
Racoon	BLY	—	Navy	—	O ..	..	—	—	—
Raeburn [44]	MES	250	Lamport & Holt	300, 600	P G	..	X	0.40	—
Ramos [80 122]	GLU	140	Amazon Telegraph Co.	300, 600	P ..	..	—	—	—
Ranella [44]	MZP	150	Anglo-Saxon Petroleum Co. ..	—	P G	..	—	0.40	—
Ranger MLD [80]	MLD	150	Liverpool Salvage Association ..	300, 600	P ..	..	X	0.05 [83]	0.50 [89]
Raphael [44]	MET	140	Lamport & Holt	300, 600	P G	..	X	0.40	—
Rathmore [80]	GUT	250	London & North Western Railway Co.	300, 600	P G	..	N	0.05	0.50
Rattlesnake	BLZ	—	Navy	—	O ..	..	—	—	—
Recorder [80 122]	MEJ	140	Eastern Extension Australasia & China Telegraph Co.	300, 600	P ..	..	—	0.40	—
Redpole	BMB	—	Navy	—	O ..	..	—	—	—
Reindeer [80]	MSD	120	Great Western Railway Co. ..	300, 600	P G	..	N	0.05	0.50
Rembrandt MEU [44]	MEU	250	Lamport & Holt	300, 600	P G	..	X	0.40	—
Remuera [79]	MKV	250	New Zealand Shipping Co. ..	300, 600	P G	..	X	0.40	—
Renard	BMC	—	Navy	—	O ..	..	—	—	—
Restitution [80]	GSE	130	Southern Whaling & Sealing Co...	300, 600	P ..	..	X	—	—
Reventazon [44]	MMI	150	Elders & Fyffes	300, 600	P G	..	X	0.40	—
Rewa [44]	MQB	250	British India Steam Nav. Co. ..	300, 600	P G	..	N	0.40	—
Ribble	BMD	—	Navy	—	O ..	..	—	—	—
Ricardo a Mestres [44]	MTB	160	Andrew Weir & Co.	300, 600	P G		X	0.40	—
Rifleman	BME	—	Navy	—	O ..	..	—	—	—
Rimutaka [79]	MBT	250	New Zealand Shipping Co. ..	300, 600	P G	..	X	0.40	—
Riviera [80]	GUO	50	South Eastern & Chatham Railway	300, 600	P G	..	N	0.15	1.50
Robin	BSJ	—	Navy	—	O ..	..	—	—	—
Romney [44]	MEV	250	Lamport & Holt	300, 600	P G	..	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Rosario BQV	BQV	—	Navy	—	O	—	—	—
Roscommon [80]	GZZ	220	Union S.S. Co. of New Zealand	300, 450, **600**	P G	X	0.40	—
Roseric [44]	GLY	250	Andrew Weir & Co.	300, **600**	P G	N	0.40	—
Rossetti [44]	MEY	250	Lamport & Holt	300, **600**	P G	X	0.40	—
Rother	BMI	—	Navy	—	O	—	—	—
Rotorua [79]	MKE	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Rovenska [75]	GWB	180	Gustavus H. F. Pratt	300, **600**	P	X	—	—
Roxburgh	BEA	—	Navy	—	O	—	—	—
Royal Arthur	BER	—	Navy	—	O	—	—	—
Royalist	BKC	—	Navy	—	O	—	—	—
Royston Grange [44]	GLZ	250	Houlder Line	300, **600**	P G	X	0.40	—
Ruahine [79]	MKA	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Ruapehu [79]	MKB	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Ruby	BMJ	—	Navy	—	O	—	—	—
Runic [44]	MWC	250	White Star Line	300, **600**	P G	X	0.40	—
Sachem [44]	MOL	250	White Diamond S.S. Co. (G. Warren & Co.)	300, **600**	P G	X	0.40	—
Sagamore [44]	MPT	250	White Diamond S.S. Co. (G. Warren & Co.)	300, **600**	P G	X	0.40	—
St. Andrew [80]	GYJ	120	Fishguard & Rosslare Railways & Harbours Co.	300, **600**	P G	N	0.05	0.50
St. David [80]	GYL	120	Fishguard & Rosslare Railways & Harbours Co.	300, **600**	P G	N	0.05	0.50
St. George BOU	BOU	—	Navy	—	O	—	—	—
St. George GIB [44]	GIB	150	Canadian Pacific Railway Co.	300, **600**	P G	N	0.40	—
St. Patrick [80]	GYM	120	Fishguard & Rosslare Railways & Harbours Co.	300, **600**	P G	N	0.05	0.50
St. Vincent	BCD	—	Navy	—	O	—	—	—
Saint Tudno [80]	GNR	80	MacIver S.S. Co.	300, **600**	P R	X	0.10	1.00
Salamis [44]	GNA	250	Andrew Weir & Co.	300, **600**	P G	N	0.40	—
Saldanha [44]	GEG	150	Ellerman & Bucknall S.S. Co.	300, **600**	P G	X	0.40	—
Salmo [44]	GYI	250	T. Wilson, Sons & Co.	300, **600**	P G	8.30 a.m. to 1 p.m., 2 p.m. to 7 p.m., 8 p.m. to midnight	0.15 [74]	0.90 [74]
Salsette [44]	MMT	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
[illegible]	[illegible]		Tank Storage & Carriage Co.	300, **600**	P	X	—	—

[illegible]	MAC	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Hilario [44]	MIZ	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Jeronimo [44]	MJP	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Lorenzo [44]	MND	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Melito [44]	MRZ	250	Eagle Oil Transport Co.	300 600	P G ..	X	0.40	—
San Nazario [44]	MUH	150	Eagle Oil Transport Co.	300, 600	P G ..	—	0.40	—
San Onofre [44]	GAA	170	Eagle Oil Transport Co.	300, 600	P G ..	—	0.40	—
San Ricardo [44]	MBR	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Silvestre [44]	MYS	—	Eagle Oil Transport Co.	300, 600	P G ..	—	0.40	—
Santhia [44]	GOE	160	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
San Tirso [44]	MAO	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Urbano [44]	MCC	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Valerio [44]	MHZ	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
San Zeferino [44]	MPS	250	Eagle Oil Transport Co.	300, 600	P G ..	X	0.40	—
Sapphire BHB	BHB	—	Navy	—	O	—	—	—
Sapphire MHK [4 44]	MHK	200	Duke of Bedford	300, 600	P G ..	X	—	—
Sappho	BGE	—	Navy	—	O	—	—	—
Saracen	BML	—	Navy	—	O	—	—	—
Sardinia GMB [44]	GMB	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G ..	X	0.40	—
Sardinian [44]	MDN	250	Allan Line	300, 600	P G ..	N	0.40	—
Sarnia MKY [44]	MKY	250	London & South Western Railway	300, 600	P G ..	N	0.15	1.50
Satanta [92]	GTG	125	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Saturnia [44]	MBF	250	Donaldson Bros.	300, 600	P G ..	N	0.40	—
Savage	BMN	—	Navy	—	O	—	—	—
Saxon [44]	MQI	250	Union Castle	300, 600	P G ..	N	0.40	—
Saxonia [44]	MSA	250	Cunard Line	300, 600	P G ..	N	0.40	—
Scandinavian [44]	MNC	250	Allan Line	300, 600	P G ..	N	0.40	—
Scindia [44]	MHJ	250	Anchor Line	300, 600	P G ..	X	0.40	—
Scorpion BMO	BMO	—	Navy	—	O	—	—	—
Scotia [80]	GRR	170	London & North Western Railway Co.	300, 600	P G ..	N	0.05	0.50
Scotian [44]	MJN	250	Allan Line	300, 600	P G ..	N	0.40	—
Scourge	BMP	—	Navy	—	O	—	—	—
Scylla	BGF	—	Navy	—	O	—	—	—
Sealda [44]	GOF	170	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Seistan [80]	GWY	100	Strick Line	300, 600	P G ..	X	0.40	—
Sentinel BHQ	BHQ	—	Navy	—	O	—	—	—
Sentinel MFB [80 122]	MFB	140	Eastern Telegraph Co.	300, 450, 600	P	—	0.40	—
Sequoya [92]	GQE	130	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Shabonee [92]	GSS	140	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Shannon	BEB	—	Navy	—	O	—	—	—
Sharpshooter	BPA	—	Navy	—	O	—	—	—
Sheldrake	BMR	—	Navy	—	O	—	—	—
Sherard Osborn [80 122]	MFK	140	Eastern Telegraph Co.	300, 450, 600	P	—	0.40	—
Shirala [44]	GOG	170	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Shropshire [80]	GSF	330	Federal Steam Nav. Co.	300, 450, 600	P G ..	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—

Ship Stations—Continued

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Siamese Prince [44]	YYN	—	Prince Line	300, **600**	P G	—	0.40	—
Sicilia GMC [44]	GMC	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	X	0.40	—
Sicilian [44]	MUN	250	Allan Line	300, **600**	P G	N	0.40	—
Silvertown [44]	GMD	140	Anglo-American Oil Co.	300, **600**	P G	—	0.40	—
Singapore [44]	YYA	—	Westminster Shipping Co.	300, **600**	P G	—	0.4	—
Sir Harvey Adamson [44]	MUK	150	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Sirius BGG	BGG	—	Navy	—	O	—	—	—
Skipjack	BPX	—	Navy	—	O	—	—	—
Skirmisher	BHR	—	Navy	—	O	—	—	—
Snipe	BSL	—	Navy	—	O	—	—	—
Somali [44]	MIW	250	Peninsular & Oriental Steam Nav. Co	300, **600**	P G	X	0.40	—
Somerset GQD [80]	GQD	225	Federal Steam Nav. Co.	300, **600**	P G	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Sorata [44]	MIJ	250	Pacific Steam Navigation Co.	300, **600**	P G	9 a.m. to 11 a.m., 8 p.m. to 2 a.m.	0.40	—
Soudan [44]	MNB	250	Peninsular & Oriental Steam Nav. Co.	300, **600**	P G	N	0.40	—
Southampton	BGH	—	Navy	—	O	—	—	—
Southwestern Miller [44]	MTY	170	Norfolk and North American S.S. Co.	300, **600**	P G	X	0.40	—
Spanker	BPY	—	Navy	—	O	—	—	—
Spartiate	BES	—	Navy	—	O	—	—	—
Sphinx	BPI	—	Navy	—	O	—	—	—
Spitfire	BMT	—	Navy	—	O	—	—	—
Staunch	BMU	—	Navy	—	O	—	—	—
Stephen [44]	MDJ	250	Booth S.S. Co.	300, **600**	P G	X	0.40	—
Stour	BMV	—	Navy	—	O	—	—	—
Strombus [44]	MYQ	150	Anglo-Saxon Petroleum Co.	—	P G	—	0.40	—
Submarine B5	BOK	—	Navy	—	O	—	—	—
Suevic [44]	MJC	250	White Star Line	300, **600**	P G	X	0.40	—
Suffolk BEC	BEC	—	Navy	—	O	—	—	—
Suffolk GRV [94]	GRV	300	Potter, Trinder and Gwyn	300, **600**	P G	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m.,	0.40	—

Surat [44] ..	[illegible]	170	British India Steam Nav. Co. ..	300, 600	P G ..	N	0.40	—
			[illegible] Nav. Co. ..	—	P G ..	—	0.40	—
Sutherland Grange [44] ..	GMM	250	Houlder Line	300, 600	P G ..	X	0.40	—
Sutlej BED	BED	—	Navy	—	O	—	—	—
Sutlej GWL [75]	GWL	115	James Nourse, Ltd.	300, 600	P G ..	X	0.40	—
Suveric [44]	GMO	250	Andrew Weir & Co.	300, 600	P G ..	N	0.40	—
Suwanee [44]	MIY	150	Anglo-American Oil Co.	300, 600	P G ..	X	0.40	—
Swale	BMW	—	Navy	—	O	—	—	—
Swanmore [44]	MAE	250	Johnston Line (Furness, Withy & Co.)	300, 600	P G ..	X	0.40	—
Swazi [44]	MAV	150	Ellerman & Bucknall S.S. Co. ..	300, 600	P G ..	X	0.40	—
Swift	BMX	—	Navy	—	O	—	—	—
Swiftsure	BCF	—	Navy	—	O	—	—	—
Sylvia BMY	BMY	—	Navy	—	O	—	—	—
Syren	BRT	—	Navy	—	O	—	—	—
Syria GMP [44]	GMP	250	Peninsular & Oriental Steam Nav. Co.	300, 600	P G ..	X	0.40	—
Tactician [44]	MWP	180	T. and J. Harrison	300, 600	P G ..	X	0.40	—
Tagus [44]	GUF	250	Royal Mail Steam Packet Co. ..	300, 600	P G ..	N	0.40	—
Tahchee [92]	GSI	140	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Tahiti [81]	MYN	250	Union S.S. Co. of New Zealand ..	300, 600	P G ..	N	0.40	—
Tainui [44]	MWF	250	Shaw Savill & Albion Co. ..	300, 600	P G ..	X	0.40	—
Takada [44]	MOR	250	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Talbot	BGI	—	Navy	—	O	—	—	—
Talthybius [80]	GSH	90	A. Holt & Co.	300, 450, 600	P G ..	X	0.40	4.00
Tamaha [92]	GSG	140	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Tara [44]	GMQ	250	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Taroba [44]	GMR	250	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Tarquah [44]	MZT	250	Elder Dempster	300, 600	P G ..	X	0.40	—
Tartar	BNA	—	Navy	—	O	—	—	—
Tascalusa [92]	GSD	140	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Tatarrax [92]	GSK	140	Tank Storage & Carriage Co. ..	300, 600	P	X	—	—
Teal	BSR	—	Navy	—	O	—	—	—
Teesta [44]	GMT	250	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Telconia [80, 122]	MCJ	140	Telegraph Construction & Maintenance Co.	300, 600	P	X	—	—
Temeraire	BCG	—	Navy	—	O .. .	—	—	—
Tenasserim [75]	GQY	136	British & Burmese Steam Nav Co	300, 600	P G .	10 a.m. to midday, 2 p.m. to 4 p.m., 8 p.m. to midnight	0.40	—
Tennyson [54]	GDG	250	Lamport & Holt	300, 600	P G .	N	0.40	—
Terrible	BET	—	Navy	—	O	—	—	—
Test	BNB	—	Navy	—	O	—	—	—
Teucer [80]	GSJ	90	A. Holt & Co.	300, 450, 600	P G ..	X	0.40	4.00
Teutonic [44]	MTC	250	White Star Line	300, 600	P G ..	N	0.40	—
Teviot	BNC	—	Navy	—	O	—	—	—
Thames BPJ	BPJ	—	Navy	—	O	—	—	—
Themistocles MGM [44] ..	MGM	250	Aberdeen Line (G. Thompson & Co.)	300, 600	P G ..	X	0.40	—
Theseus	BEU	—	Navy	—	O	—	—	—
Thetis BPK	BPK	—	Navy	—	O	—	—	—
Thistle	BPZ	—	Navy	—	O	—	—	—
Thongwa [44]	GMU	250	British India Steam Nav. Co. ..	300, 600	P G ..	X	0.40	—
Thorn	BRU	—	Navy	—	O .. .	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Thrasher	BRV	—	Navy	—	O	—	—	—
Thunderer	BCH	—	Navy	—	O	—	—	—
Tiger BCW	BCW	—	Navy	—	O	—	—	—
Tigress	BND	—	Navy	—	O	—	—	—
Titan [80]	GSO	90	A. Holt & Co.	300, 450, **600**	P G	X	0.40	4.00
Tonawanda [41]	GMV	150	Anglo-American Oil Co.	300, **600**	P G	X	0.40	—
Topaze	BHC	—	Navy	—	O	—	—	—
Torch	BQF	—	Navy	—	O	—	—	—
Torilla [44]	GOJ	170	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Toronto GBS [44]	GBS	250	T. Wilson, Sons & Co.	300, **600**	P G	8 a.m. to 1 p.m., 2 p.m. to 5 p.m. 6 p.m. to 10 p.m.	0.40	—
Torpedo Boat No. 1	BUU	—	Navy	—	O	—	—	—
Torpedo Boat No. 2	BNU	—	Navy	—	O	—	—	—
Torpedo Boat No. 3	BRY	—	Navy	—	O	—	—	—
Torpedo Boat No. 4	BNV	—	Navy	—	O	—	—	—
Torpedo Boat No. 5	BNW	—	Navy	—	O	—	—	—
Torpedo Boat No. 11	BUW	—	Navy	—	O	—	—	—
Torpedo Boat No. 13	BUV	—	Navy	—	O	—	—	—
Torpedo Boat No. 14	BNX	—	Navy	—	O	—	—	—
Torpedo Boat No. 15	BNY	—	Navy	—	O	—	—	—
Torpedo Boat No. 16	BRZ	—	Navy	—	O	—	—	—
Torpedo Boat No. 17	BUY	—	Navy	—	O	—	—	—
Torpedo Boat No. 18	BUZ	—	Navy	—	O	—	—	—
Torpedo Boat No. 19	BVA	—	Navy	—	O	—	—	—
Torpedo Boat No. 20	BVB	—	Navy	—	O	—	—	—
Torpedo Boat No. 21	BSA	—	Navy	—	O	—	—	—
Torpedo Boat No. 22	BSB	—	Navy	—	O	—	—	—
Torpedo Boat No. 23	BVC	—	Navy	—	O	—	—	—
Torpedo Boat No. 24	BSC	—	Navy	—	O	—	—	—
Torpedo Boat No. 25	BNZ	—	Navy	—	O	—	—	—
Torpedo Boat No. 28	BOA	—	Navy	—	O	—	—	—
Torpedo Boat No. 29	BOB	—	Navy	—	O	—	—	—
Torpedo Boat No. 30	BOC	—	Navy	—	O	—	—	—
Torpedo Boat No. 31	BOD	—	Navy	—	O	—	—	—
Torpedo Boat No. 32	BOE	—	Navy	—	O	—	—	—
Torpedo Boat No. 33	BOF	—	Navy	—	O	—	—	—
Torpedo Boat No. 34	BOG	—	Navy	—	O	—	—	—
Torpedo Boat No. [illegible]	BOH	—	Navy	—	O	—	—	—

Tortuguero [illegible]	MMO	150	Elders & Fyffes	300, 600	P G	X	0.40	—
Transmitter [illegible]	GQO	150	Eastern Telegraph Co.	300, 450, 600	P ..	X	0.40	—
Transylvania [44]	MVR	220	Anchor Line	300, 600	P G	X	0.40	—
Trefoil	BQP	—	Navy	—	O ..	—	—	—
Trent [44]	GUH	250	Royal Mail Steam Packet Co.	300, 600	P G	N	0.40	—
Tropic [44]	GDU	250	White Star Line	300, 600	P G	X	0.40	—
Tunisian [44]	MTN	250	Allan Line	300, 600	P G	N	0.40	—
Turakina [75]	MKJ	250	New Zealand Shipping Co.	300, 600	P G	X	0.40	—
Turcoman [44]	GEA	250	Dominion Line	300, 600	P G	X	0.40	—
Turmoil	BSF	—	Navy.	—	O ..	—	—	—
Tuscania [44]	YZE	—	Anchor Line	300, 600	P G	—	0.40	—
T.W.I. (Whaler) [80]	GSR	45	Southern Whaling & Sealing Co.	300	P ..	X	—	—
Tyne	BQW	—	Navy	—	O ..	—	—	—
Uganda [44]	GOK	170	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Ula [44]	GOL	170	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Ulster [44]	MCW	140	City of Dublin Steam Packet Co.	300, 600	P G	N	0.05	0.50
Ultonia [44]	MTA	250	Cunard Line	300, 600	P G	N	0.40	—
Ulysses GBU [44]	GBU	250	A. Holt & Co.	300, 600	P G	X	0.40	—
Umaria [44]	MUL	140	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Umballa [44]	GOM	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Umta [44]	GON	170	Britisn India Steam Nav. Co.	300, 600	P G	X	0.40	—
Uncas GSA [92]	GSA	140	Tank Storage & Carriage Co.	300, 600	P ..	X	—	—
Undaunted	BKD	—	Navy	—	O ..	—	—	—
Unity	BNF	—	Navy	—	O ..	—	—	—
Upada [44]	GOO	160	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Ure	BNG	—	Navy	—	O ..	—	—	—
Usk	BNH	—	Navy	—	O ..	—	—	—
Valiant BCB	BCB	—	Navy	—	O ..	—	—	—
Valiant GES [4, 44]	GES	150	Lord Pirrie	300, 600	P G	X	0.40	—
Vanguard	BCJ	—	Navy	—	O ..	—	—	—
Varela [44]	MSR	250	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Varsova [44]	MUM	200	British India Steam Nav. Co.	300, 600	P G	X	0.40	—
Vasari [44]	GMZ	250	Lamport & Holt	300, 600	P G	N	0.40	—
Vauban [44]	MJW	250	Lamport & Holt	300, 600	P G	N	0.40	—
Velox	BNI	—	Navy	—	O ..	—	—	—
Venerable	BCK	—	Navy	—	O ..	—	—	—
Vengeance	BCL	—	Navy	—	O ..	—	—	—
Venus BGJ	BGJ	—	Navy	—	O ..	—	—	—
Verdi [44]	GNB	250	Lamport & Holt	300, 600	P G	N	0.40	—
Vernon	BOR	—	Navy	—	O ..	—	—	—
Vestris [44]	MJZ	250	Lamport & Holt	300, 600	P G	N	0.40	—
Victor	BNJ	—	Navy	—	O ..	—	—	—
Victoria GUP [60]	GUP	50	South Eastern & Chatham Railway	300, 600	P G	N	0.15 [50]	1.50 [50]
Victoria MWD [44]	MWD	250	Pacific Steam Nav. Co.	300, 600	P G	N	0.40	—
Victoria and Albert [4]	BQH	—	Government	—	O ..	—	—	—
Victorian MVN [44]	MVN	250	Allan Line	300, 600	P G	N	0.40	—
Victorious	BCM	—	Navy	—	O ..	—	—	—
Vienna [60]	GPL	130	Great Eastern Railway	300, 450, 600 [45]	P R [47]	N	0.10	1.00
Vigilant BNK	BNK	—	Navy	—	O ..	—	—	—
Viking BNL	BNL	—	Navy	—	O ..	—	—	—
Viking MCD [44, 122]	MCD	140	Amazon Telegraph Co.	300, 600	P ..	X	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
GREAT BRITAIN—*contd.*							Francs.	Francs.
Vindictive	BGK	—	Navy	—	O	—	—	—
Violet	BNN	—	Navy	—	O	—	—	—
Virginian MGN [44]	MGN	250	Allan Line	300, **600**	P G	N	0.40	—
Vita [44]	MZV	220	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Vitruvia [44]	GYS	150	Gow, Harrison & Co.	300, **600**	P G	X	0.40	—
Vixen BRW	BRW	—	Navy	—	O	—	—	—
Volumnia [44]	GRM	140	Gow, Harrison & Co.	—	P G	—	0'40	—
Vulcan BPB	BPB	—	Navy	—	O	—	0.40	—
Wabasha [92]	GTN	125	Tank Storage & Carriage Co.	300, **600**	P	X	—	—
Waimana [44]	GNE	250	Shaw Savill & Albion Co.	300, **600**	P G	X	0.40	—
Waimate [79]	MOS	150	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Waipara [44]	GNK	250	British India Steam Nav. Co.	300, **600**	P G	X	0.40	—
Waiwera [44]	MRV	250	Shaw Savill & Albion Co.	300, **600**	P G	X	0.40	—
Walmer Castle [44]	MQH	250	Union Castle	300, **600**	P G	N	0.40	—
Walton Hall [44]	MTH	150	Hall Line	300, **600**	P G	X	0.40	—
Wapello [92]	GQL	125	Tank Storage & Carriage Co.	300, **600**	P	X	—	—
Warspite	BEG	—	Navy	—	O	—	—	—
Warwickshire [44]	MYO	250	Bibby Bros. & Co.	300, **600**	P G	X	0.40	—
Watchful	BPM	—	Navy	—	O	—	—	—
Waveney	BNO	—	Navy	—	O	—	—	—
Wayfarer [44]	GCI	250	T. & J. Harrison	300, **600**	P G	X	0.40	—
Wear	BNQ	—	Navy	—	O	—	—	—
Welland	BNR	—	Navy	—	O	—	—	—
Welshman [44]	GEB	250	Dominion Line	300, **600**	P G	X	0.40	—
Westmeath [79]	MJQ	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Weymouth	BGL	—	Navy	—	O	—	—	—
Whakatane [79]	MRI	250	New Zealand Shipping Co.	300, **600**	P G	X	0.40	—
Widgeon	BSP	—	Navy	—	O	—	—	—
Wiltshire [80]	GHD	330	Federal Steam Nav. Co.	300, **600**	P G	9 a.m. to 12.30 p.m., 1 p.m. to 2 p.m., 4 p.m. to 6 p.m., 8 p.m. to 1 a.m.	0.40	—
Winamac [92]	GSM	140	Tank Storage & Carriage Co.	300, **600**	P	X	—	—
Winifredian [44]	MFL	250	F. Leyland & Co.	300, **600**	P G	N	0.40	—
Wolf BRX	BRX	—	Navy	—	O	—	—	—
Wolverine BNS	BNS	—	Navy	—	O	—	—	—
Woodcock	BSN	—	Navy	—	O	—	—	—
[illegible]	[illegible]			—	O	—	—	—

Yarmouth BGM	BGM		Navy		O ..	—	—	—
Zealandic [44]	MUZ	250	White Star Line	300, 600	P G	X	0.40	—
Zulu	BNT	—	Navy	—	O ..	—	—	—
GREECE								
Aetos	SYO	—	Navy	—	O	—	—	—
Aigli	SYV	—	Navy	—	O ..	—	—	—
Alcyon	SYU	—	Navy	—	O ..	—	—	—
Amfitrite	SYM	—	Navy	—	O ..	—	—	—
Amphitrite [4]	—	—	Government	—	—	—	—	—
Andreas [68]	SVS	100–150	Embiricos Bros.	300, 600	P G	X	0.40	4.00
Arethousa	SYW	—	Navy	—	O ..	—	—	—
Aspis	SYI	—	Navy	—	O ..	—	—	—
Averoff	SYA	—	Navy	—	O ..	—	—	—
Chariton [68]	SVO	100–150	Georges M. Embiricos	300, 600	P G	X	0.40	4.00
Crios [68]	SVC	100–150	Embiricos Bros.	300, 600	P G	X	0.40	4.00
Daphni	SYX	—	Navy	—	O ..	—	—	—
Doris SYY	SYY	—	Navy	—	O ..	—	—	—
Doxa	SYD	—	Navy	—	O ..	—	—	—
Ghoïssa [4 60]	SVG	150	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 600	P G	N	0.40	4.00
Helli	SZA	—	Navy	—	—	—	—	—
Hydra SYH	SYH	—	Navy	—	O ..	—	—	—
Ieraz	SYE	—	Navy	—	O ..	—	—	—
Ioannina [68]	SVI	200	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 450, 600	P G	N	0.40	4.00
Kanaris	SYJ	—	Navy	—	O ..	—	—	—
Keravnos	SYK	—	Navy	—	O ..	—	—	—
Kilkis	SZC	—	Navy	—	O ..	—	—	—
Leon	SYL	—	Navy	—	O ..	—	—	—
Limnos	SZB	—	Navy	—	O ..	—	—	—
Lonchi	SYC	—	Navy	—	O ..	—	—	—
Nafkratousa	SYR	—	Navy	—	O ..	—	—	—
Nea Gennea	SYG	—	Navy	—	O ..	—	—	—
Niki	SYN	—	Navy	—	O ..	—	—	—
Panthir	SYP	—	Navy	—	O ..	—	—	—
Patris [68]	SVP	140	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 450, 600	P G	N	0.40	4.00
Psara	SYQ	—	Navy	—	O ..	—	—	—
Sfendoni	SYF	—	Navy	—	O ..	—	—	—
Spetsai	SYS	—	Navy	—	O ..	—	—	—
Themistocles SVT [68]	SVT	220	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 450, 600	P G	N	0.40	4.00
Thétis SYZ	SYZ	—	Navy	—	O ..	—	—	—
Thyella	SYT	—	Navy	—	O ..	—	—	—
Vasilefs Constantinos [68]	SVV	200–250	National Steam Nav. Co. of Greece (Embiricos Bros.)	300, 600	P G	N	0.40	4.00
Velos	SYB	—	Navy	300, 600	O ..	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
HOLLAND							Francs.	Francs.
Ameland [68]	PIX	50–80	Stoomvaart Maatschappij Triton	300, **600**	P G	X	0.40	4.00
American PDT [11]	PDT	100–150	American Petroleum Co.	300, **600**	P G	X	0.40	4.00
Antenor [11]	PEW	150–200	Nederlandsche Stoomvaart-Maatschappij "Oceaan"	300, **600**	P G	X	0.40	4.00
Arakan [11]	PHD	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00
Ares [11 91]	PDY	150–200	Ned. Ind. Tank-stoombootmaatschappij	300, **600**	P G	X	0.40	4.00
Artemis PDZ [11 91]	PDZ	150–200	Ned. Ind. Tankstoombootmaatschappij	300, **600**	P G	X	0.40	4.00
Atlas PIB [11 95]	PIB	75–100	Amsterdam Tug and Salvage Co.	300, 450, **600**	P G	X	0.40	4.00
Bali [11]	PIK	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Bandoeng [11]	PGD	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00
Banka [11]	PHI	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Batavier II. [11]	PDG	200	Wm. H. Müller & Co.	**300**, 450, 600	P R [60]	N	0.05 [63]	0.50 [63]
Batavier III. [11]	PDH	200	Wm. H. Müller & Co.	**300**, 450, 600	P R [60]	N	0.05 [63]	0.50 [63]
Batavier IV. [11]	PDI	200	Wm. H. Müller & Co.	**300**, 450, 600	P R [60]	N	0.05 [63]	0.50 [63]
Batjan [11]	PGV	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Bawean [11]	PHJ	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Bengkalis [11 91]	PHZ	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Billiton [11]	PGT	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Bintang [11]	PHV	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Boeroe [11]	PHK	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Boeton [11]	PGU	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Borneo [11]	PHY	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Brinio	PAV	60	Navy	300, **600**	O [61]	—	—	—
Brunswijk [68]	PIV	50–80	Erhardt & Dekkers	300, **600**	P G	X	0.40	4.00
Buitenzorg [11]	PHU	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00
Bulhond	PBZ	150	Navy	300, **600**	O [61]	—	—	—
Celebes [11]	PGO	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00

							2 p.m. to 6 p.m., 8 p.m. to 10 p.m.		
Dardanus [11]	PEV	150–200	Nederlandsche Stoomvaart Maatschappij " Oceaan "	300, **600**	P G	..	X	0.40	4.00
Deli [11]	PGG	100–150	Rotterdamsche Lloyd	300, **600**	P G	..	X	0.40	4.00
De Ruijter	PAC	200	Navy	300, **600**	O [61]	..	—	—	—
De Zeven Provinciën	PAA	400	Navy	300, **600**	O [61]	..	—	—	—
Djambi [11]	PIM	100–150	Rotterdamsche Lloyd	300, **600**	P G	..	X	0.40	4.00
Djember [11]	PHF	100–150	Rotterdamsche Lloyd	300, **600**	P G	..	X	0.40	4.00
Eibergen [68]	PIW	100	Furness' Scheepvaart en Agentuur-Maatschappij	300, **600**	P G	..	X	0.40	4.00
Evertsen	PAN	100	Navy	300, **600**	O [61]	..	—	—	—
Fret	PBY	150	Navy	300, **600**	O [61]	..	—	—	—
Frisia PEF [11]	PEF	200–250	Koninklijke Hollandsche Lloyd ..	300, **600**	P G	..	N	0.40	4.00
Friso	PAW	60	Navy	300, **600**	O [61]	..	—	—	—
Garoet [11]	PIN	100–150	Rotterdamsche Lloyd	300, **600**	P G	..	X	0.40	4.00
Gelderland	PAK	100	Navy	300, **600**	O [61]	..	—	—	—
Gelria [11]	PEG	200–250	Koninklijke Hollandsche Lloyd ..	300, 450, **600**	P G	..	N	0.40	4.00
Goentoer [11]	PFA	200	Rotterdamsche Lloyd	300, **600**	P G	..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m to 10 p.m.	0.40	4.00
Gorontalo [11]	PGC	100–150	Rotterdamsche Lloyd	300, **600**	P G	..	X	0.40	4.00
Grotius [11]	PFI	200	" Nederland " Stoomvaart Maatschappij	300, **600**	P G	..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Gruno	PAU	60	Navy	300, **600**	O [61]	..	—	—	—
Hercules PIF [11] [114]	PIF	50–100	Amsterdam Tug and Salvage Co.	300, **600**	P G	..	X	0.40	4.00
Hermelijn	PBT	150	Navy	300, **600**	O [61]	..	—	—	—
Hermes [11] [91]	PDX	150–200	Ned.-Ind. Tank-stoombootmaatschappij	300, **600**	P G	..	X	0.40	4.00
Hertog Hendrik	PAD	200	Navy	300, **600**	O [61]	..	—	—	—
Hestia [11] [91]	PDP	100–150	Ned.-Ind. Tank-stoombootmaatschappij	300, **600**	P G	..	X	0.40	4.00
Holland PAH	PAH	200	Navy	300, **600**	O [61]	..	—	—	—
Hollandia [11]	PEH	200–250	Koninklijke Hollandsche Lloyd..	300, **600**	P G	..	N	0.40	4.00
Hydra PAQ	PAQ	60	Navy	300, **600**	O [61]	..	—	—	—
Insulinde [11]	PFS	150–200	Rotterdamsche Lloyd	300, **600**	P G	..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Jacob van Heemskerck ..	PAL	100	Navy	300, **600**	O [61]	..	—	—	—
Jakhals	PBU	150	Navy	300, **600**	O [61]	..	—	—	—
Jan Pieterszoon Coen [11] ..	PFL	150–200	" Nederland " Stoomvaart Maatschappij	300, **600**	P G	..	6 a.m. to 8.10 a.m., 9 a.m. to 12.10 p.m., 2 p.m. to 6.10 p.m., 8 p.m. to 10-10 p.m.	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
HOLLAND—*contd.*							Francs.	Francs.
J. B. Aug. Kessler [11]	PDV	150–200	Koninklijke Nederlandsche Maats. tot Exploitatie v. Petroleum Bronnen in Nederl. Indie	300, **600**	P G	X	0.40	4.00
Juno PDU [11] [91]	PDU	150–200	Ned.-Ind. Tank-stoombootmaatschappij	300, **600**	P G	X	0.40	4.00
Kambangan [11]	PGS	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Kangean [11]	PGP	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Karimata [11]	PGQ	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Karimoen [11]	PGW	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Kawi [11]	PFD	200	Rotterdamsche Lloyd	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Kelbergen [68]	PIZ	100–150	Furness' Scheepvaart en-Agentuur-Maatschappij	300, **600**	P G	X	0.40	4.00
Koningen der Nederlanden [11]	PFO	200	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Koningin Regentes PAE	PAE	400	Navy	300, **600**	O [61]	—	—	—
Koningin Regentes PDB [56] [96]	PDB	150	Zeeland Co.	300, 500,[58] **600**	P R [59]	N	— [62]	— [62]
Kortenaer	PAM	100	Navy	300, **600**	O [61]	—	—	—
Krakatau [11]	PGL	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
La Campine [11]	PDQ	100–150	American Petroleum Co.	300, **600**	P G	X	0.40	4.00
Lombok [11]	PGN	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Lynx PBX	PBX	150	Navy	300, **600**	O [61]	—	—	—
Maarten Harpertz. Tromp	PAB	400	Navy	300, **600**	O [61]	—	—	—
Madioen [11]	PGI	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00
Maria [11]	PDK	50–80	Holland Gulf Stoomvaart Maatschappij (J. de Poorter)	300, **600**	P G	X	0.40	4.00
[illegible]	PCA	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00

Merauke	PG[illegible]	100–150	Rotterdamsche Lloyd	300, **600**	P G ..	X	0.40	4.00
Newyork PHN [11]	PHN	100–150	American Petroleum Co.	300, **600**	P G ..	X	0.40	4.00
Nias [11]	PGR	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G ..	X	0.40	4.00
Nickerie [11]	PER	150–200	Koninklijke West-Indische Maildienst	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Nieuw Amsterdam [11]	PEB	200–250	Holland-Amerika Line	300, **600**	P G ..	N	0.40	4.00
Noordam [11]	PEC	200–250	Holland-Amerika Line	300, **600**	P G ..	N	0.40	4.00
Noordbrabant	PAJ	200	Navy	300, **600**	O [61] ..	—	—	—
Noorderdijk [11]	PGY	200	Holland-Amerika Line	300, 450, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Noordwijk [68]	PHG	100	Erhardt & Dekkers	300, **600**	P G ..	X	0.40	4.00
Ocean PDS [11]	PDS	100–150	American Petroleum Co.	300, **600**	P G ..	X	0.40	4.00
Onderzeeboot [65]	PBO [65]	20	Navy	300	O [61] ..	—	—	—
Oosterdijk [11]	PGX	200	Holland-Amerika Line	300, 450, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Ophir PFB [11]	PFB	200	Rotterdamsche Lloyd	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.,	0.40	4.00
Oranje [11]	PFP	200	"Nederland" Stoomvaart Maatschappij	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Oranje Nassau PDE [57] [96] ..	PDE	150	Zeeland Co.	300, 500,[58] **600**	P R [59] ..	N	— [62]	— [62]
Oranje Nassau PEM [11] ..	PEM	150–200	Koninklijke West Indische Maildienst	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 1 p.m. to 5 p.m.	0.40	4.00
Panter	PBS	150	Navy	300, **600**	O [61] ..	—	—	—
Patroclus [11]	PEU	150–200	Nederlandsche Stoomvaart-Maatschappij "Oceaan"	300, **600**	P G ..	X	0.40	4.00
Piet Hein	PAO	100	Navy	300, **600**	O [61] ..	—	—	—
Prins der Nederlanden **PEN** [11]	PEN	150–200	Koninklijke West Indische Maildienst	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 1 p.m. to 5 p.m.	0.40	4.00
Prins der Nederlanden PFQ [11]	PFQ	200	"Nederland" Stoomvaart Maatschappij	300, **600**	P G ..	6 a.m. to 9 a.m., 10 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Prinses Juliana [11]	PFX	200	"Nederland" Stoomvaart Maatschappij	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Prins Frederik Hendrik [11] ..	PEK	150–200	Koninklijke West Indische Maildienst	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 1 p.m. to 5 p.m.	0.40	4.00
Prins Hendrik [56] [96]	PDC	150	Zeeland Co.	300, 500,[58] **600**	P R [59] ..	N	— [62]	— [62]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
HOLLAND—*contd.*							Francs	Francs.
Prins Willem I.[11]	PEO	200	Koninklijke West Indische Maildienst	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Radja [11]	PHA	100–150	"Nederland" Stoomvaart Maatschappij	300, 450, **600**	P G	X	0.40	4.00
Randwijk [68]	PIU	50–80	Erhardt & Dekkers	300, **600**	P G	X	0.40	4.00
Rembrandt PFK [11]	PFK	200	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Rijndam [11]	PED	200–250	Holland-Amerika Line	300, **600**	P G	N	0.40	4.00
Rijswijk [68]	PIT	50–80	Erhardt & Dekkers	300, **600**	P G	X	0.40	4.00
Rindjani [11]	PFH	200	Rotterdamsche Lloyd	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Riouw [11]	PHB	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Roepat [11]	PHL	100–150	"Nederland" Stoomvaart Maatschappij	300, 450, **600**	P G	X	0.40	4.00
Rondo [11]	PHM	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Roode Zee [11] [114]	PIA	100	L. Smit & Co.'s Sleepdienst	300, **600**	P G	X	0.40	4.00
Rotterdam PEA [11]	PEA	200–250	Holland-Amerika Line	300, **600**	P G	N	0.40	4.00
Rotterdam PHH [11]	PHH	100	American Petroleum Co.	300, **600**	P G	X	0.40	4.00
Rotti [11]	PHC	100–150	"Nederland" Stoomvaart Maatschappij	300, **600**	P G	X	0.40	4.00
Samarinda [11]	PGH	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00
Sarpedon [11]	PET	150–200	Nederlandsche Stoomvaart-Maatschappij "Oceaan"	300, **600**	P G	X	0.40	4.00
Schiedijk [11]	PIQ	150–200	Holland-Amerika Line	300, **600**	P G	X	0.40	4.00
Selene [11] [91]	PDW	150–200	Ned.-Ind. Tankstoombootmaatschappij	300, **600**	P G	X	0.40	4.00
Simson [11] [114]	PIE	50–100	Amsterdam Tug & Salvage Co.	300, **600**	P G	X	0.40	4.00
Sindoro [11]	PFE	200	Rotterdamsche Lloyd	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Sitoebondo [11]	PHT	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00
Soerakarta [11]	PGJ	100–150	Rotterdamsche Lloyd	300, **600**	P G	X	0.40	4.00

			chappij					
Tabanan [11]	PFF	200	Rotterdamsche Lloyd	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Tambora [11]	PFC	200	Rotterdamsche Lloyd	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Tantalus [11]	PES	150–200	Nederlandsche Stoomvaart-Maatschappij "Oceaan"	300, **600**	P G ..	X	0.40	4.00
Ternate [11]	PGF	100–150	Rotterdamsche Lloyd	300, **600**	P G ..	X	0.40	4.00
Torpedoboot [64]	PAG [64]	40	Navy	300	O [61] ..	—	—	—
Tosari [11]	PIO	100–150	Rotterdamsche Lloyd	300, **600**	P G ..	X	0.40	4.00
Turbinia PHR [68]	PHR	100–150	Ruys & Zoonen	300, **600**	P G ..	X	0.40	4.00
Van der Duyn [11]	PHP	100–150	Algemeene Stoomvaart Maatschappij	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Van Hogendorp [11]	PHO	100–150	Algemeene Stoomvaart Maatschappij	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Veenbergen [68]	PHS	100–150	Furness' Scheepvaart en-Agentuur-Maatschappij	300, **600**	P G ..	X	0.40	4.00
Veendijk [11]	PIR	150–200	Holland-Amerika Line	300, **600**	P G ..	X	0.40	4.00
Vondel [11]	PFM	200	"Nederland" Stoomvaart Maatschappij	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Vos	PBV	150	Navy	300, **600**	O [61] ..	—	—	—
Westerdijk [11]	PGZ	200	Holland-Amerika Line	300, 450, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Wilis [11]	PFG	200	Rotterdamsche Lloyd	300, **600**	P G ..	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Willem van Driel Sr.[11] ..	PHW	100–150	Van Driel's N/V.W., Stoomb. en Transp.	300, 600	P G ..	X	0.40	4.00
Winterswijk [68]	PIS	50–80	Erhardt & Dekkers	300, **600**	P G ..	X	0.40	4.00
Witte Zee [11 114]	PIC	75–125	L. Smit & Co.'s Sleepdienst ..	300, **600**	P G ..	X	0.40	4.00
Wolf PBW	PBW	150	Navy	300, **600**	O [61] ..	—	—	—
Ysseldijk [68]	PIP	150–200	Holland-Amerika Line	300, **600**	P G ..	X	0.40	4.00
Zeehond	PAZ	100	Navy	300, **600**	O [61] ..	—	—	—
Zeeland PAF	PAF	200	Navy	300, **600**	O [61] ..	—	—	—
Zeelandia [11]	PEI	200–250	Koninklijke Hollandsche Lloyd ..	300, **600**	P G ..	N	0.40	4.00
Zwarte Zee [11 114]	PID	75–125	L. Smit & Co.'s Sleepdienst ..	300, **600**	P G ..	X	0.40	4.00
HONDURAS (REPUBLIC OF)								
Tegucigalpa [54]	VB	—	Vaccaro Bros. & Co.	—	P G ..	X	0.40	—
Yoro [54]	VY	—	Vaccaro Bros. & Co.	—	P G ..	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
							Francs.	Francs.
HONG KONG								
Mexico City [44]	VRG	—	Mexico S.S. Co., Ltd.	300, **600**	P G	—	—	—
Nile [54]	VRE	300	China Pacific S.S. Co.	300, **600**	P G	N	0.40	4.00
HUNGARY [120]								
							Francs.	Francs.
Ferencz Ferdinánd	HDA	Day, 200; night, 300	Royal Hungarian Sea Nav. Co. "Adria"	300, **600**	P G	8 a.m. to midday, 4 p.m. to midnight	0.40	4.00
Ferencz József Király	HBA	Day, 200; night, 300	Royal Hungarian Sea Nav. Co. "Adria"	300, **600**	P G	8 a.m. to midday, 4 p.m. to midnight	0.40	4.00
ITALY								
Adriatico [66]	IEO	190	State Railway Administration	300, **600**	P	X	0.40	—
Agordat	IKR	—	Navy	—	—	—	—	—
Alpino	IBE	—	Navy	—	—	—	—	—
America [66]	IZA	270	Navigazione Générale Italiana	300, **600**	P G	N	0.40	—
Amerigo Vespucci	IVG	—	Navy	—	—	—	—	—
Ammiraglio Magnaghi	IVY	—	Navy	—	—	—	—	—
Ammiraglio Saint Bon	IHV	—	Navy	—	—	—	—	—
Andrea Doria	IHA	—	Navy	—	—	—	—	—
Animoso	IBD	—	Navy	—	—	—	—	—
Aquilone	IBF	—	Navy	—	—	—	—	—
Archimede	IVU	—	Navy	—	—	—	—	—
Ardente	IBB	—	Navy	—	—	—	—	—
Ardito	IBA	—	Navy	—	—	—	—	—
Artigliere	IBG	—	Navy	—	—	—	—	—
Audace	IBC	—	Navy	—	—	—	—	—
Basilicata	IKL	—	Navy	—	—	—	—	—
Bayonne [66]	ILB	190	Soc. Italo-Americana pel Petrolio	300, **600**	P	X	0.40	—
Bengasi	IVI	—	Navy	—	—	—	—	—
Bersagliere	IBH	—	Navy	—	—	—	—	—
Bologna [66]	ITB	190	La Veloce Navigazione Italiana a Vap.	300, **600**	P G	N	0.40	—
Borea	IBI	—	Navy	—	—	—	—	—
Brasile [66]	IED	190	"Italia" Societa di Nav. a Vap.	300, **600**	P G	N	0.40	—

Cagliari [66]	INR	140	Soc. di Nav., Sicilia	300, 600	P		X	
Campania IKM	IKM	—	Navy	—	—	—	—	—
Capitano Verri	IVS	—	Navy	—	—	—	—	—
Caprera IKW	IKW	—	Navy	—	—	—	—	—
Caprera IZC [66]	IZC	190	Navigazione Générale Italiana ..	300, 600	P ..		X	0.40	—
Carabiniere	IBJ	—	Navy	—	—	—	—	—
Carlo Alberto	IKA	—	Navy	—	—	—	—	—
Caserta [66]	IYZ	190	Lloyd Italiano	300, 600	P G ..		N	0.40	—
Catania INN [66]	INN	190	Societa Marittima Italiana ..	300, 600	P		X	0.40	—
Cavour [66]	IUC	190	Transatlantica Italiana Soc. di Nav	300, 600	P G ..		N	0.40	—
Cervino [66]	ILR	190	State Railway Administration ..	300 600	P		X	0.40	—
Ciclope	IVQ	—	Navy	—	—	—	—	—
Città di Catania [66]	IET	190	State Railway Administration ..	300, 600	P G ..		N	0.40	—
Città di Milano	IVJ	—	Navy	—	—	—	—	—
Città di Palermo [66]	IEP	190	State Railway Administration ..	300, 600	P G ..		N	0.40	—
Città di Siracusa [66]	IES	190	State Railway Administration ..	300, 600	P G ..		N	0.40	—
Città di Trieste [66]	INE	190	Soc. di Nav., Sicilia	300, 600	P		X	0.40	—
Città di Tripoli [66]	INP	190	Soc. di Nav., Sicilia	300, 600	P		X	0.40	—
Coatit	IKS	—	Navy	—	—	—	—	—
Conte di Cavour	IHD	—	Navy	—	—	—	—	—
Corazziere	IBK	—	Navy	—	—	—	—	—
Cordova IYJ [66]	IYJ	190	Lloyd Italiano	300, 600	P G ..		X	0.40	—
Curtatone	IVL	—	Navy	—	—	—	—	—
Dandolo	IHH	—	Navy	—	—	—	—	—
Dante Alighieri IHC	IHC	—	Navy	—	—	—	—	—
Dante Alighieri IUH [66] ..	IUH	270	Transatlantica Italiana Soc. di Nav.	300, 600	P G ..		N	0.40	—
Dardo	IBL	—	Navy	—	—	—	—	—
Duca d'Aosta [66]	IZT	270	Navigazione Générale Italiana ..	300, 600	P G ..		N	0.40	—
Duca degli Abruzzi [66]	IZZ	270	Navigazione Générale Italiana ..	300, 600	P G ..		N	0.40	—
Duca di Genova [66]	IZG	270	La Veloce Navigazione Italiana a Vap.	300, 600	P G ..		N	0.40	—
Duilio	IHB	—	Navy	—	—	—	—	—
Elba	IKI	—	Navy	—	—	—	—	—
Emanuele Filiberto	IHW	—	Navy	—	—	—	—	—
Enna [66]	INJ	140	Soc. di Nav., Sicilia	300, 600	P		X	0.40	—
Entella [66]	INW	140	Soc. di Nav., Sicilia	300, 600	P		X	0.40	—
Eridano..	IVO	—	Navy	—	—	—	—	—
Eritrea	IVX	—	Navy	—	—	—	—	—
Espero	IBM	—	Navy	—	—	—	—	—
Etna IKG	IKG	—	Navy	—	—	—	—	—
Etna IZN [66]	IZN	190	Navigazione Générale Italiana ..	300, 600	P		X	0.40	—
Etruria IKP	IKP	—	Navy	—	—	—	—	—
Etruria INQ [66]	INQ	140	Soc. di Nav., Sicilia	300, 600	P		X	0.40	—
Euro	IBN	—	Navy	—	—	—	—	—
Europa IEE [66]	IEE	270	La Veloce Navigazione Italiana a Vap.	300, 600	P G ..		N	0.40	—
Flavio Gioja	IVE	—	Navy	—	—	—	—	—
Francesco Ferruccio	IHZ	—	Navy	—	—	—	—	—
Fuciliere	IBO	—	Navy	—	—	—	—	—
Fulmine	IBP	—	Navy	—	—	—	—	—
Galileo Galilei	IVP	—	Navy	—	—	—	—	—
Garibaldi IUA [66]	IUA	190	Transatlantica Italiana Soc. di Nav.	300, 600	P G ..		N	0.40	—
Garibaldino	IBQ	—	Navy	—	—	—	—	—

Ship Stations—*Continuea*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
ITALY—*contd.*							Francs.	Francs.
Giovanni Bausan	IVD	—	Navy	—	—	—	—	—
Giuliana	IVT	—	Navy	—	—	—	—	—
Giulio Cesare	IHE	—	Navy	—	—	—	—	—
Giuseppe Verdi [66]	IUV	270	Transatlantica Italiana Soc. di Nav.	300, **600**	P G	N	0.40	—
Goito	IKU	—	Navy	—	—	—	—	—
Governolo	IVN	—	Navy	—	—	—	—	—
Granatiere	IBR	—	Navy	—	—	—	—	—
Iela [4] [96]	IMA	162	His Majesty the King of Italy	300, **600**	P	—	—	—
Impavido	IBV	—	Navy	—	—	—	—	—
Impetuoso	IBW	—	Navy	—	—	—	—	—
Indiana IYI [66]	IYI	190	Lloyd Italiano	300, **600**	P G	N	0.40	—
Indomito	IBS	—	Navy	—	—	—	—	—
Insidioso	IBT	—	Navy	—	—	—	—	—
Iride	IKT	—	Navy	—	—	—	—	—
Irrequieto	IBX	—	Navy	—	—	—	—	—
Ischia [66]	INZ	190	Societa Marittima Italiana	300, **600**	P	X	0.40	—
Italia IHG	IHG	—	Navy	—	—	—	—	—
Italia IEL [66]	IEL	190	State Railway Administration	300, **600**	P	X	0.40	—
Italia IZI [66]	IZI	190	" Italia " Societa di Nav. a Vap.	300, **600**	P G	X	0.40	—
Lampo IBY	IBY	—	Navy	—	—	—	—	—
Lampo ILL [66]	ILL	190	Soc. Italo-Americana pel Petrolio,	300, **600**	P	X	0.40	—
Lanciere	IBZ	—	Navy	—	—	—	—	—
Leonardo da Vinci	IHF	—	Navy	—	—	—	—	—
Libia	IKH	—	Navy	—	—	—	—	—
Liguria	IKQ	—	Navy	—	—	—	—	—
Lombardia	IKO	—	Navy	—	—	—	—	—
Luisiana [66]	IYL	190	Lloyd Italiano	300, **600**	P G	N	0.40	—
M. A. Colonna	IVR	—	Navy	—	—	—	—	—
Maiella [66]	ILN	190	State Railway Administration	300, **600**	P	X	0.40	—
Marco Minghetti [66]	INH	140	Soc. di Nav., Sicilia	300, **600**	P	X	0.40	—
Marco Polo	IKC	—	Navy	—	—	—	—	—
Marsala	IKE	—	Navy	—	—	—	—	—
Milano [66]	INM	110	Soc. Italiana di Servizi Marittimi	300, **600**	P G	X	0.40	—
Milazzo [66]	IZM	190	Navigazione Générale Italiana	300, **600**	P	X	0.40	—
Minas [66]	IUE	190	Soc. Anon. Angelo Parodi fu Bartolomeo	300, **600**	P G	X	0.40	—
Minerva IKX	IKX	—	Navy	—	—	—	—	—
Misurata	IVV	—	Navy	—	—	—	—	—
[illegible] [66]	ILO	190	State Railway Administration	300, **600**	P	X	0.40	—

Monte Bianco [66]	[illegible]	190	State Railway Administration	300, 600	P ..	X	0.40	—
Monviso [66]	ILV	190	State Railway Administration	300, 600	P ..	X	0.40	—
Napoli IHO	IHO	—	Navy	—	—	—	—	—
Napoli IZS [66]	IZS	190	"Italia" Societa di Nav. a Vap.	300, 600	P G	N	0.40	—
Nembo	IDA	—	Navy	—	—	—	—	—
Nino Bixio	IKF	—	Navy	—	—	—	—	—
Orione [66]	INF	190	Societa Marittima Italiana	300, 600	P ..	X	0.40	—
Ostro	IDB	—	Navy	—	—	—	—	—
Partenope	IKY	—	Navy	—	—	—	—	—
Piemonte IKJ	IKJ	—	Navy	—	—	—	—	—
Piemonte INX [66]	INX	140	Soc. di Nav., Sicilia	300, 600	P ..	X	0.40	—
Pisa IHR	IHR	—	Navy	—	—	—	—	—
Po [66]	INY	140	Soc. di Nav., Sicilia	300, 600	P ..	X	0.40	—
Pontiere	IDC	—	Navy	—	—	—	—	—
Porto di Adalia [66]	INA	190	Societa Marittima Italiana	300, 600	P ..	X	0.40	—
Porto di Alessandretta [66]	INT	190	Societa Marittima Italiana	300, 600	P ..	X	0.40	—
Porto di Savona [66]	INV	190	Societa Marittima Italiana	300, 600	P G	X	0.40	—
Principe di Udine [66]	IYU	270	Lloyd Sabaudo	300, 600	P G	N	0.40	—
Principessa Mafalda [66]	IYM	270	Lloyd Italiano	300, 600	P G	N	0.40	—
Procida [66]	IZD	190	Navigazione Générale Italiana	300, 600	P ..	X	0.40	—
Prometeo [66]	IFP	100	State Railway Administration	600	O ..	X	—	—
Puglia	IKK	—	Navy	—	—	—	—	—
Quarto	IKD	—	Navy	—	—	—	—	—
Ravenna [66]	ITR	190	"Italia" Societa di Nav. a Vap.	300, 600	P G	N	0.40	—
Re d'Italia [66]	IYR	190	Lloyd Sabaudo	300, 600	P G	N	0.40	—
Regina d'Italia [66]	INI	190	Lloyd Sabaudo	300, 600	P G	N	0.40	—
Regina Elena IHQ	IHQ	—	Navy	—	—	—	—	—
Regina Elena IZE [66]	IZE	270	Navigazione Générale Italiana	300, 600	P G	N	0.40	—
Re Umberto IHK	IHK	—	Navy	—	—	—	—	—
Re Vittorio [66]	IZV	270	Navigazione Générale Italiana	300, 600	P G	N	0.40	—
Roma IHP	IHP	—	Navy	—	—	—	—	—
Roma INR [66]	INR	110	Societa Marittima Italiana	300, 600	P G	X	0.40	—
San Giorgio IEA [66]	IEA	190	Soc. di Nav. a Vap. Sicula Americana (Peirce Bros.)	300, 600	P G	N	0.40	—
San Giorgio IHU	IHU	—	Navy	—	—	—	—	—
San Guglielmo [66]	IEB	190	Soc. di Nav. a Vap. Sicula Americana (Peirce Bros.)	300, 600	P G	N	0.40	—
San Marco	IHT	—	Navy	—	—	—	—	—
Sardegna IHM	IHM	—	Navy	—	—	—	—	—
Sardegna INS [66]	INS	110	Soc. Italiana di Servizi Marittimi	300, 600	P G	X	0.40	—
Savoia [66]	IEH	190	La Veloce Navigazione Italiana a Vap.	300, 600	P G	N	0.40	—
Sebastiano Caboto	IVZ	—	Navy	—	—	—	—	—
Sicilia IHL	IHL	—	Navy	—	—	—	—	—
Sicilia INL [66]	INL	110	Soc. Italiana di Servizi Marittmi	300, 600	P G	X	0.40	—
Siracusa [66]	INU	190	Societa Marittima Italiana	300, 600	P G	X	0.40	—
Solunto [66]	IEU	140	Soc. di Nav., Sicilia	300, 600	P ..	X	0.40	—
Splendor [66]	ILS	190	Soc. Italo-Americana pel Petrolio	300, 600	P ..	X	0.40	—
Staffetta	IVK	—	Navy	—	—	—	—	—
Sterope	IVB	—	Navy	—	—	—	—	—
Strale	IDD	—	Navy	—	—	—	—	—
Stromboli [66]	IZP	190	Navigazione Générale Italiana	300, 600	P ..	X	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-length in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
ITALY—*contd.*							Francs.	Francs.
Taormina [66]	IYT	270	Lloyd Italiano	300, **600**	P G	N	0.40	—
Tobruk	IVW	—	Navy	—	—	—	—	—
Tomaso di Savoia [66]	IYS	190	Lloyd Sabaudo	300, **600**	P G	N	0.40	—
Torino [66]	INO	110	Soc. Italiana di Servizi Marittimi	300, **600**	P G	X	0.40	—
Toscana [66]	ITT	190	"Italia" Societa di Nav. a Vap.	300, **600**	P G	N	0.40	—
Trinacria [4]	IVC	—	Government	—	—	—	—	—
Tripoli	IKV	—	Navy	—	—	—	—	—
Umbria [66]	ITU	190	Soc. Italiana di Servizi Marittimi	300, **600**	P G	X	0.40	—
Varese	IHY	—	Navy	—	—	—	—	—
Verona [66]	ITV	270	Navigazione Générale Italiana	300, **600**	P G	N	0.40	—
Vesuvio [66]	IZQ	190	Navigazione Générale Italiana	300, **600**	P	X	0.40	—
Vettor Pisani	IKB	—	Navy	—	—	—	—	—
Vittorio Emanuele	IHN	—	Navy	—	—	—	—	—
Volta	IVH	—	Navy	—	—	—	—	—
Volturno	IVM	—	Navy	—	—	—	—	—
Vulcano IVF	IVF	—	Navy	—	—	—	—	—
Vulcano IZO [66]	IZO	190	Navigazione Générale Italiana	300, **600**	P	X	0.40	—
Zeffiro	IDF	—	Navy	—	—	—	—	—
JAPAN								
Adzuma	JRD	—	Navy	—	O	—	—	—
Akashi	JLM	—	Navy	—	O	—	—	—
Aki	JGK	—	Navy	—	O	—	—	—
Aki Maru [98]	JAI	Day, 500; night, 1500	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Akitsushima	JUQ	—	Navy	—	O	—	—	—
America Maru [98]	JAC	Day, 400; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Annan Maru [80]	JPN	Day, 200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**, 1,800	P G	N	0.40	—
Anyo Maru [98]	JAY	Day, 450; night, 900	Toyo Kisen Kaisha (Oriental S.S. Co)	300, **600**	P G	N	0.40	—
Asahi	JGB	—	Navy	—	O	—	—	—
Asama	JRA	—	Navy	—	O	—	—	—
Aso	JRL	—	Navy	—	O	—	—	—
Atagosan Maru [80]	JYA	Day, 400	Ryoto Kisen Kaisha (Mitsui Bussan Kaisha)	300, **600**, 1,800	P	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight.	—	—

Bingo Maru [98]	JBG	Day, 300; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G	N	0.40	—
Borneo Maru [66]	JPB	Day, 400	Nanyo Yusen Kaisha	300, 600, 1,800	P G	N	0.40	—
Buyo Maru [54]	JPX	Day, 100	Toyo Kisen Kaisha (chartered by Standard Oil Co. of New York)	300, 600	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight.	0.40	4.00
Canada Maru [98]	JCD	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	N	0.40	—
Chicago Maru [98]	JCC	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	N	0.40	—
Chihaya	JWB	—	Navy	—	O	—	—	—
Chikuma	JLG	—	Navy	—	O	—	—	—
Chitose	JLB	—	Navy	—	O	—	—	—
Chivoda	JUP	—	Navy	—	O	—	—	—
Chosen Maru [80]	JPV	Day, 200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600, 1,800	P G	N	0.40	—
Fuji	JUC	—	Navy	—	O	—	—	—
Fushimi	JWJ	—	Navy	—	O	—	—	—
Fushimi Maru [98]	JFM	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Fuso	JGN	—	Navy	—	—	—		—
Hakata Maru [80]	JPK	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Harbin Maru [98]	JHB	Day, 450; night, 1200	Osaka Shosen Kaisha (Osake Mercantile Co.)	300, 600	P G	N	0.40	
Haruna	JGX	—	Navy	—	—	—	—	—
Hashidate	JUO	—	Navy	—	O	—	—	—
Hawaii Maru [98]	JHW	Day, 450; night, 1300	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600, 1,800	P G	N	0.40	—
Hayatori Maru [98]	JHY	100	Ministry of Agriculture and Commerce	300, 600	P G	N	0.40	—
Hiei	JGV	—	Navy	—	O	—	—	—
Hirano Maru [98]	JHR	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Hirato	JLJ	—	Navy	—	O	—	—	—
Hitachi Maru [98]	JHC	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Hizen	JGD	—	Navy	—	O	—	—	—
Hongkong Maru [98]	JHN	Day, 300; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, 600	P G	N	0.40	—
Ibuki	JGT	—	Navy	—	O	—	—	—
Idzumo	JRG	—	Navy	—	O	—	—	—
Iki Maru [98]	JIL	Day, 350; night, 1000	Imperial Government Railways	300, 600, 1,800	P G	N	0.40	—
Ikoma	JGQ	—	Navy	—	O	—	—	—
Inaba Maru [98]	JIB	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G	N	0.40	—
Itsukushima	JUN	—	Navy	—	O	—	—	—
Iwami	JUD	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
JAPAN—*contd.*							Francs.	Francs.
Iwate	JRF	—	Navy	—	O	—	—	—
Iyo Maru [80]	JPO	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Kaga Maru [80]	JPG	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Kagi Maru [98]	JKG	Day, 300; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Kamakura Maru [80]	JPR	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight.	0.40	—
Kamo Maru [98]	JKA	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Kanagawa Maru [98]	JNA	Day, 350; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Karasaki	JUV	—	Navy	—	O	—	—	—
Kasagi	JLA	—	Navy	—	O	—	—	—
Kasato Maru [98]	JKT	Day, 300; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Kashima	JGG	—	Navy	—	O	—	—	—
Kashima Maru [98]	JKX	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Kasuga	JRJ	—	Navy	—	O	—	—	—
Katori	JGF	—	Navy	—	O	—	—	—
Katori Maru [98]	JKR	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Kawachi	JGL	—	Navy	—	O	—	—	—
Kawachi Maru [86]	JPC	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Kayo Maru [98]	JKO	Day, 250; night, 800	Oaki Goshi Kaisha (Oaki Co.)	300, **600**	P G	N	0.40	—
Kinkasan Maru [80]	JYK	Day, 400	Mitsui Bussan Kaisha	300, **600**, 1,800	P G	8 a.m. to 11 a.m., 2 p.m. to 5 p.m., 8 p.m. to midnight.	0.40	—
Kirishima	JGW	—	Navy	—	—	—	—	—
Kitano Maru [98]	JKN	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Kiyo Maru [98]	JKY	Day, 250;	Toyo Kisen Kaisha (Oriental S.S.	300, **600**	P G	N	0.40	—

Koma Maru [98]	JKL	Day, 400; night, 1200	Imperial Government Railways	300, **600**, 1,800	P G	N	0.40	—
Kongo	JGU	—	Navy	—	O	—	—	—
Kosai Maru	JKS	Day, 120; night, 200	Chosen Government	—	— [98]	N	—	—
Kunajiri Maru [98]	JKU	Day, 450; night, 1300	Nihon Kaiin Ekisai Kai (Japan Seamen Aid Society)	300, **600**	P G	N	0.40	—
Kurama	JGR	—	Navy	—	O	—	—	—
Manila Maru [98]	JMR	Day, 450; night, 1300	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**, 1,800	P G	N	0.40	—
Manshu	JUT	—	Navy	—	O	—	—	—
Matsuye	JUZ	—	Navy	—	O	—	—	—
Mexico Maru [98]	JMX	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Mikasa	JGC	—	Navy	—	O	—	—	—
Mishima	JUL	—	Navy	—	O	—	—	—
Mishima Maru [98]	JMQ	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Miyazaki Maru [98]	JMY	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Mogami	JWD	—	Navy	—	O	—	—	—
Musashi	JUY	—	Navy	—	O	—	—	—
Niitaka	JLN	—	Navy	—	O	—	—	—
Nikko Maru [98]	JNL	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Nippon Maru [98]	JNP	Day, 300; night, 1000	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, **600**	P G	N	0.40	—
Nisshin	JRK	—	Navy	—	O	—	—	—
Ogasawara Maru [122]	JOG	Day, 300; night, 800	Ministry of Communications	300, **600**	— [38]	—	—	—
Okinawa Maru [122]	JON	Day, 350; night, 1000	Ministry of Communications	300, **600**	— [38]	—	—	—
Okinoshima	JUK	—	Navy	—	O	—	—	—
Otowa	JLP	—	Navy	—	O	—	—	—
Panama Maru [98]	JPM	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Persia Maru [80]	JPP	Day, 400	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Riojun Maru [80]	JYR	Day, 400	Nanyo Yusen Kaisha	300, **600** 1,800	P G	N	0.40	—
Sado Maru [98]	JSD	Day, 300; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Saga JWL	JWL	—	Navy	—	O	—	—	—
Sakaki Maru [98]	JKI	Day, 400; night, 1200	Teikoku Kaiji Kyokwai (Imperial Marine Association)	300, **600**	P G	N	0.40	—
Sanuki Maru [80]	JPS	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.	300, **600**, 1,800	P G	N	0.40	—
Satsuma JGJ	JGJ	—	Navy	—	O	—	—	—
Seattle Maru [98]	JST	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Seiyo Maru [98]	JSY	Day, 400; night, 1000	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, **600**	P G	N	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
JAPAN—*contd.*							Francs.	Francs.
Settsu	JGM	—	Navy	—	O	—	—	—
Shidzuoka Maru [98]	JSZ	Day, 350; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Shikishima	JGA	—	Navy	—	O	—	—	—
Shinano Maru [98]	JSN	Day, 350; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Shinyo Maru JSH [98]	JSH	Day, 450; night, 1500	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, **600**	P G	N	0.40	—
Shiragi Maru [98]	JSK	Day, 350; night, 1000	Imperial Government Railways	300, **600**, 1,800	P G	N	0.40	—
Siam Maru [80]	JYX	Day, 200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**, 1,800	P G	N	0.40	—
Siberia Maru [80]	JBR	Day, 500; night, 1500	Toyo Kisen Kaisha (Oriental S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Suma	JLL	—	Navy	—	O	—	—	—
Sumida	JWG	—	Navy	—	O	—	—	—
Suwa Maru [98]	JSU	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Suwo	JUG	—	Navy	—	O	—	—	—
Tacoma Maru [98]	JTA	Day, 350; night, 1200	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Taichu Maru [98]	JTC	Day, 300; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Tainan Maru [98]	JTN	Day, 300; night, 1000	Osaka Shosen Kaisha (Osaka Mercantile Co.)	300, **600**	P G	N	0.40	—
Taisei Maru [24] [98]	JTM	Day, 300; night, 1000	Mercantile Marine School	300, **600**	P G	N	0.40	—
Tajima Maru [80]	JPJ	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Tamba Maru [98]	JTB	Day, 300; night, 1000	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**	P G	N	0.40	—
Tango Maru [98]	JTG	Day, 450; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Tatsuno Maru [80]	JPU	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, **600**, 1,800	P G	N	0.40	—
Tatsuta	JWA	—	Navy	—	O	—	—	—
[illegible] Maru [98]	JTK	Day, 350;	Minami Manshu Kisen Kaisha	300, **600**	P G	N	0.40	—
Tempaisan Maru [80]	[illegible]	[illegible]	[illegible]					

[illegible]	[illegible]	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Tokiwa	JRB	—	Navy	—	O ..	—	—	—
Tokiwa Maru [80]	JYW	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Tokushima Maru [98]	JTQ	Day, 450; night, 1300	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Tokuyama Maru [98]	JTU	Day. 450; night, 1300	Nippon Yusen Kaisha (Japan Mail S.S. Co.	300, 600, 1,800	P G ..	N	0.40	—
Tone	JLF	—	Navy	—	O ..	—	—	—
Tottori Maru [80]	JPQ	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S.Co.)	300, 600, 1,800	P G ..	N	0.40	—
Toyama Maru [98]	JTX	Day, 450; night 1300	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Toyohashi Maru [80]	JPT	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Toyooka Maru [98]	JYO	Day, 450; night, 1300	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Tsugaru	JLC	—	Navy	—	O ..	—	—	—
Tsuruga Maru [80]	JPA	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Tsushima	JLO	—	Navy	—	O ..	—	—	—
Tsushima Maru JMA [98]	JMA	Day, 450; night, 1300	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1.800	P G ..	N	0.40	—
Tsushima Maru JTL [98]	JTL	Day, 350; night, 1000	Imperial Government Railways ..	300, 600, 1,800	P G ..	N	0.40	—
Tsuyama Maru [80]	JYM	Day, 400	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Uji	JWF	—	Navy	—	O ..	—	—	—
Wakamiva	JUR	—	Navy	—	—	—	—	—
Wakasa Maru [80]	JPW	Day, 200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600, 1,800	P G ..	N	0.40	—
Yahagi	JLK	—	Navy	—	O ..	—	—	—
Yakumo	JRC	—	Navy	—	O ..	—	—	—
Yamato	JUX	—	Navy	—	O ..	—	—	—
Yodo	JWC	—	Navy	—	O ..	—	—	—
Yokohama Maru [98]	JYH	Day, 350; night, 1200	Nippon Yusen Kaisha (Japan Mail S.S. Co.)	300, 600	P G ..	N	0.40	—
MEXICO								
Coahuila [54]	XBL	—	Compania Mexicana de Nav. S.A.	—	P G ..	—	0.40	—
General Zaragoza	XCA	—	Navy	600	O ..	2 a.m. to 6 a.m., 6 p.m. to 10 p.m.	—	—
Jalisco [54]	XBK	—	Compania Mexicana de Nav. S.A.	—	P G ..	—	0.40	—
Korrigan III [54]	XBF	200	Cia du Boleo	300, 600	P G ..	X	0.40	—
Mexico XBB [44]	XBB	120	Compania Mexicana de Nav. S.A.	300, 600	P G ..	X	0.40	—
San Antonio [44]	XBE	130	Cia Mexicana de Vap. "San Antonio," S.A.	300, 600	P G ..	X	0.40	—
San Bernardo [44]	XBA	170	Cia Mexicana de Petroleo "El Aguila," S.A.	300, 600	P G ..	X	0.40	—
San Cristobal [54]	XBI	—	Cia Mexicana de Petroleo "El Aguila," S.A.	—	P.G ..	—	0.40	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word	Ship Charge. Minimum Charge.
							Francs.	Francs.
MONACO								
Hirondelle [4]	CQA	380	Prince of Monaco	**600**	P	X	—	—
MOROCCO								
Faci	CNJ	120	Customs Administration	300	O	N	—	—
Marrakchi	CNM	120	Customs Administration	300	O	N	—	—
Meknassi	CNK	120	Customs Administration	300	O	N	—	—
Taroudant	CNT	120	Customs Administration	300	O	N	—	—
NEW ZEALAND								
Arahura [81]	VMA	Day, 150; night, 400	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.20	—
Atua [81]	VLU	325	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Hinemoa	VLS	Day, 300; night, 700	Government	—	—	—	—	—
Maheno [81]	VLE	325	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Maitai [81]	VLT	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Makura [81]	VLK	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Manuka [81]	VLN	325	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Maori VLZ [81]	VLZ	Day, 250; night, 500	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Marama [81]	VLR	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Maunganui [81]	VLG	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Moana [81]	VLO	325	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Mokoia [81]	VMK	Day, 250; night, 500	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Monowai [81]	VMM	Day, 250; night, 500	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.20	—
Navua [81]	VLV	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Paloona [81]	VLY	Day, 250; night, 500	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Talune [81]	VLL	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
Tarawera [81]	VMT	Day, 150; night, 400	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.20	—
Tofua [81]	VLF	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—
[illegible]	VLX	325 night, 500	Government	300, **600**	O	X	—	—
[illegible]	VLQ	250	Union S.S. Co. of New Zealand	300, **600**	P G	X	0.40	—

A 2 LAV	LAV	—	Navy	—	O	—	—	—
A 3 LAW	LAW	—	Navy	—	O	—	—	—
A 4 LAX	LAX	—	Navy	—	O	—	—	—
A 5 LAY	LAY	—	Navy	—	O	—	—	—
Admiralen [100]	LDU	—	Crew Levick Co.	—	P G	X	0.40	4.00
Ageröen [80]	LFZ	150–200	H. E. Hansen-Tangen	300, **600**	P G	X	0.40	4.00
Artemis LFW [68]	LFW	150–200	Norway Mexico Gulf Line (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Atle Jarl [80]	LEY	100-150	Det Nordenfjeldske Dampskibsselskab	300, **600**	P G	X	0.20	2.00
Atna [80]	LFC	150–250	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Bayard [80] [91]	LER	150–200	Akties. Bonheur (F. Olsen)	300, **600**	P G	X	0.40	4.00
Belridge [80]	LEF	100–150	Akties. Tankfart (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Bergensfjord [11]	LFB	200	Den Norske-Amerika-Linje	300, 450, **600**	P G	N	0.40	4.00
Bessheim [80]	LDA	160	A/S Ganger Rolf (F. Olsen)	300, 450, **600**	P G	N	0.28	2.80
Björgvin	LBB	—	Navy	—	O	—	—	—
Bonna [80]	LFX	150–200	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Borgestad [100]	LDZ	150	A/S Borgestad (G. Knudsen)	300, 450, **600**	P G	X	0.40	4.00
Brazil LEQ [80] [91]	LEQ	150–200	Akties. Brazil (F. Olsen)	300, **600**	P G	X	0.40	4.00
Caloric [80]	LED	150–200	Akties. Dmpsk. Atlantic (W. Jebsen)	300, **600**	—	X	0.40	4.00
Capto [11]	LGL	100–150	B. Stolt-Nielsen	300, **600**	P G	X	0.40	4.00
Cometa [80]	LDS	125–175	Det Bergenske Dampskibsselskab	300 **600**	P G	X	0.20	2.00
Commonwealth LDD [80]	LDD	40	Chr. Nielsen & Co.	300, 450, **600**	P G	X	—	—
Cuzco [100]	LEG	150	A/S Cuzco (W. Wilhelmsen)	300, **600**	P G	6 a.m. to 8 a.m., 9 a.m. to midday, 2 p.m. to 6 p.m., 8 p.m. to 10 p.m.	0.40	4.00
Drammensfjord [80]	LFL	100–150	Den Norske Amerika-linje	300, **600**	P G	X	0.40	4.00
Draug	LAI	—	Navy	—	O	—	—	—
Eidsvold	LAA	—	Navy	—	O	—	—	—
Einar Jarl [80]	LEP	160–320	Det Nordenfjeldske Dampskibsselskab	300, 450, **600**	P G	X	0.40	4.00
Ellida	LAG	—	Navy	—	O	—	—	—
Elsa [68]	LFV	150–200	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Estrella [80]	LDT	125–175	Det Bergenske Dampskibsselskab	300, **600**	P G	X	0.20	2.00
Falkland [68]	LDC	150–250	Akties. Rethval (H. Fredriksen)	300, **600**	P G	X	0.40	4.00
Farm	LAH	—	Navy	—	O	—	—	—
Folkvard [80] [91]	LGA	100–150	Government	300, **600**	P G	X	0.40	4.00
Frithjof LAE	LAE	—	Navy	—	O	—	—	—
Garm	LBC	—	Navy	—	O	—	—	—
George Washington LFQ [80]	LFQ	150–200	Petter Olsen	300, **600**	P G	X	0.40	4.00
Golaa [80]	LGM	100–150	F. Siegwarth	300, **600**	P G	X	0.40	4.00
Haakon VII. [80]	LDL	160	Det Nordenfjeldske Dampskibsselskab	300, 450, **600**	P G	1 a.m. to 3 a.m., 7 a.m. to 9 a.m., 1 p.m. to 3 p.m., 7 p.m. to 9 p.m.	0.20	2.00
Hamlet [68] [91]	LGD	160	Brunsgaard Kiösterud & Co.	300, **600**	P G	X	0.20	2.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave lengths in Metres (the Normal Wave length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
NORWAY—*contd.*							Francs.	Francs.
Hanna Nielsen [11]	LGI	200–250	B. Stolt-Nielsen	300, **600**	P G	X	0.40	4.00
Harald Haarfagre	LAB	—	Navy	—	O	—	—	—
Heimdal	LAZ	—	Navy	—	O	—	—	—
Hektoria	LCA	Day, 270; night, 540	Akties. Hektor. (N. Bugge)	300, **600**	P G	X	0.30	3.00
Hval	LAN	—	Navy	—	O	—	—	—
Iris LFH [80]	LFH	120	Det Bergenske Dampskibsselskab	300, 450, **600**	P G	X	0.20	2.00
Irma [80]	LDQ	Day, 240; night, 480	Det Bergenske Dampskibsselskab	300, 450, **600**	P G	X	0.20	2.00
Jason LEL [80]	LEL	110	A/S Norsk Bjergningskompagni	300, **600**	P G	X	—	—
Jo	LAQ	—	Navy	—	O	—	—	—
Jomfruland [80]	LEA	100–150	Akties. Motor (Stavnes & Salvesen)	300, **600**	P G	X	0.40	4.00
Jupiter LEB [80]	LEB	135	Det Bergenske Dampskibsselskab	300, 450, **600**	P G	2.30 a.m. to 3 a.m., 8.30 a.m. to 9 a.m., 2.30 p.m. to 3 p.m., 8.30 p.m. to 9 p.m.	0.20	2.00
Kalfarli [11]	LGF	—	Ellingsen & Johanssen	—	P G	—	0.40	4.00
Karrakatta [80]	LDE	40	Western Australia Whaling Co. (Chr. Nielsen & Co.)	300, 450, **600**	P G	X	—	—
Kjell	LAT	—	Navy	—	O	—	—	—
Klem [80]	LDI	40	Akties. Spermacet (Chr. Nielsen & Co.)	300, 450, **600**	P G	X	—	—
Kong Harald [80]	LDK	160	Det Nordenfjeldske Dampskibsselskab	300, **600**	P G	1 a.m. to 3 a.m., 7 a.m. to 9 a.m., 1 p.m. to 3 p.m., 7 p.m. to 9 p.m.	0.20	2.00
Kristianiafjord [11]	LFK	200	Den Norske Amerika-Linje	300, 450, **600**	P G	N	0.40	4.00
Landvard [80 91]	LGC	100–150	Government	300, **600**	P G	X	0.40	4.00
Lidvard [80 91]	LGB	100–150	Government	300, **600**	P G	X	0.40	4.00
Lom	LAP	—	Navy	—	O	—	—	—
Losna [68]	LFU	150–200	Den Norske Afrika-og Australie-linje (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Luise Nielsen [11]	LGJ	200–250	B. Stolt Nielsen	300, **600**	P G	X	0.40	4.00
Lyngenfjord [11]	LFM	100–150	Den Norske Amerika-Linje	300, **600**	P G	X	0.40	4.00
Lysefjord [100]	LHL	—	Akties. Dampsk. Lysefjord (K. Olsen). Chartered by Huddleston-Marsh Mahogany Co.	—	P G	—	0.40	4.00
Mesna [68]	[illegible]		[illegible] (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00

Mexicano LDH [68]	LDH	270–320	Norway-Mexico Gulf Line (W.						
....	LFJ	120	Det Bergenske Dampskibsselskab	300, 450, **600**	P G	..	X	0.20	2.00
Nidaros LBA	LBA	—	Navy	—	O ..	..	—	—	—
Nidaros LEK [80]	LEK	110	A/S Norsk Bjergningskompagni ..	300, **600**	P G	..	X	—	—
Niels Nielsen [11]	LGH	200–250	B. Stolt Nielsen	300, **600**	P G	..	X	0.40	4.00
Norge	LAC	—	Navy	—	O ..	..	—	—	—
Noruega [68]	LDG	180	Norway-Mexico Gulf Line (W. Wilhelmsen)	300, **600**	P G	..	X	0.40	4.00
Ohio LFP [68]	LFP	150–200	Norway-Mexico Gulf Line (W. Wilhelmsen)	300, **600**	P G	..	X	0.40	4.00
Örn II.[68]	LDV	160–270	Akties. Ornen (Sören L. Christensen)	300, 450, **600**	P G	..	X	0.40	4.00
Ragnvald Jarl [80]	LDJ	160	Det Nordenfjeldske Dampskibsselskab	300, 450, **600**	P G	..	1 a.m. to 3 a.m., 7 a.m. to 9 a.m., 1 p.m. to 3 p.m., 7 p.m. to 9 p.m.	0.20	2.00
Rena [80]	LFD	150–250	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	..	X	0.40	4.00
Rio de Janeiro LDM [80] ..	LDM	200–250	Det Nordenfjeldske Dampskibsselskab	300, **600**	P G	..	X	0.40	4.00
Rio de la Plata LDN [80] ..	LDN	200–250	Det Nordenfjeldske Dampskibsselskab	300, **600**	P G	..	X	0.40	4.00
Romsdalsfjord [11]	LEJ	100–150	Den Norske Amerika-Linje ..	300, **600**	P G	..	X	0.40	4.00
Sæl	LAL	—	Navy	—	O ..	..	—	—	—
Salvage [80]	LFY	150–200	A/S Norsk Bjergningskompagni ..	300, **600**	P G	..	X	—	—
Salvator [80]	LEM	150–250	A/S Norsk Bjergningskompagni ..	300, **600**	P G	..	X	—	—
Simla LEW [68]	LEW	150–200	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	..	X	0.40	4.00
Sjoa [68]	LEX	150–200	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	..	X	0.40	4.00
Skarv	LAR	—	Navy	—	O ..	..	—	—	—
Skrei	LAM	—	Navy	—	O ..	..	—	—	—
Sterling LDB [80]	LDB	160	A/S Ganger Rolf (F. Olsen) ..	300, **600**	P G	..	N	0.28	2.80
Stolt Nielsen [11]	LGK	200–250	B. Stolt Nielsen	300, **600**	P G	..	X	0.40	4.00
Strinda [80]	LFO	100–150	J. Ludwig Mowinckel	300, **600**	P G	..	X	0.40	4.00
Svend Foyn I.[80]	LEC	Day, 215; night, 540	A/S Sydhavet (P. Bogen) ..	300, **600**	P G	..	X	0.40	4.00
Tanafjord [11]	LFA	100–150	Den Norske Amerika-Linje ..	300, **600**	P G	..	X	0.40	4.00
Teist	LAS	—	Navy	—	O ..	..	—	—	—
Thorvald Halvorsen [11] ..	LGE	—	O. D. Jentoft	—	P G	..	X	0.40	4.00
Tordenskjold	LAD	—	Navy	—	O ..	..	—	—	—
Tore Jarl [80]	LEZ	100–150	Det Nordenfjeldske Dampskibsselskab	300, **600**	P G	..	X	0.20	2.00
Trods	LAO	—	Navy	—	O ..	..	—	—	—
Troll	LAJ	—	Navy	—	O ..	..	—	—	—
Tysla [80]	LFF	150–250	Den Norske Afrika-og Australielinje (W. Wilhelmsen)	300, **600**	P G	..	X	0.40	4.00
Vaarli [11]	LGG	—	Akties. Dampsk. Vaarli (Ellingsen & Johanssen)	—	P G	..	X	0.40	4.00
Valkyrien LAK	LAK	—	Navy	—	O ..	..	—	—	—
Venus LDO [80]	LDO	Day, 240; night, 480	Det Bergenske Dampskibsselskab	300, 450, **600**	P G	..	X	0.20	2.00
Viking LAF	LAF	—	Navy	—	O ..	..	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
NORWAY—*contd.*							Francs.	Francs.
Viking LHN [100]	LHN	—	Compania Navegacion Del Sureste	—	P G	—	0.40	4.00
Vinstra [80]	LFE	150–250	Den Norske Afrika-og Australie-linje (W. Wilhelmsen)	300, **600**	P G	X	0.40	4.00
Washington LGP [80]	LGP	200–250	H. Waalman	300, **600**	P G	X	0.40	4.00
Wellington [11]	—	—	H. Waalman	300, **600**	P G	X	0.40	4.00
Zeta [80]	LDR	Day, 80; night, 160	Det Bergenske Dampskibsselskab	300, 450, **600**	P G	X	0.20	2.00
PERU								
Almirante Grau	OBG	—	Navy	—	—	—	—	—
Chalaco [130]	OBC	—	Government	—	—	—	—	—
Constitución [130]	OBO	—	Government	—	—	—	—	—
Coronel Bolognesi	OBB	—	Navy	—	—	—	—	—
Ferré	OBF	—	Navy	—	—	—	—	—
Huallaga [44]	OCH	250	Cia Peruana Vap y Dique del Callao	300, **600**	P G	X	0.40	—
Iquitos [130]	OBY	—	Government	—	—	—	—	—
Lima	OBL	—	Navy	—	—	—	—	—
Mantaro [44]	OCM	250	Cia Peruana Vap y Dique del Callao	300, **600**	P G	X	0.40	—
Pachitea [44]	OCP	250	Cia Peruana Vap y Dique del Callao	300, **600**	P G	X	0.40	—
Palacios	OBP	—	Navy	—	—	—	—	—
Teniente Rodriguez	OBR	—	Navy	—	—	—	—	—
Ucayali [44]	OCU	250	Cia Peruana Vap y Dique del Callao	300, **600**	P G	X	0.40	—
Urubamba [44]	OCR	250	Cia Peruana Vap y Dique del Callao	300, **600**	P G	X	0.40	—
PORTUGAL								
Adamastor	CTC	150	Navy	300, 450, **600**	O	N	—	—
Africa CSA [11]	CSA	160	Empreza Nacional de Navegaçao à vapor	300, 450, **600**	P G	N	0.40	4.00
Almirante Reis	CTA	150	Navy	300, 450, **600**	O	N	—	—
Ambaca [11]	CSY	100–150	Empreza Nacional de Navegaçao à vapor	300, **600**	P G	X	0.40	4.00
Angola [11]	CSH	100–150	Empreza Nacional de Navegaçao à vapor.	300, **600**	P G	X	0.40	4.00
Beira CSB [11]	CSB	160	Empreza Nacional de Navegaçao à vapor	300, 450, **600**	P G	N	0.40	4.00
Beira CTK	CTK	—	Navy	—	O	—	—	—
Bolama [11]	CSO	100–150	Empreza Nacional de Navegaçao	300, **600**	P G	X	0.40	4.00

Lazengo [11]	CSC	100–150	Empreza Nacional de N...					
[illegible]	CTJ	—	Navy	—	O	—	—	—
Dondo [11]	CSD	100–150	Empreza Nacional de Navegaçao à vapor	300, **600**	P G ..	X	0.40	4.00
Douro	CTG	—	Navy	—	O	—	—	—
Espadarte	CTF	—	Navy	—	O	—	—	—
Extremadura CSJ [11]	CSJ	100–150	Empreza Nacional de Navegaçao à vapor.	300, **600**	P G ..	X	0.40	4.00
Funchal [11]	CSF	100–150	Empreza Insulana de Navegaçao	300, **600**	P G ..	X	0.40	4.00
Guadiana	CTH	—	Navy	—	O	—	—	—
Ibo	CTL	—	Navy	—	O	—	—	—
Loanda [11]	CSL	100–150	Empreza Nacional de Navegaçao à vapor	300, **600**	P G ..	X	0.40	4.00
Moçambique [11]	CSM	160	Empreza Nacional de Navegaçao à vapor	300, 450, **600**	P G ..	N	0.40	4.00
Patria CTZ	CTZ	—	Navy	—	O	—	—	—
Peniche [11]	CSX	100–150	Furness Withy & Co.	300, **600**	P G ..	X	0.40	4.00
Peninsular [11]	CSR	100–150	Empreza Nacional de Navegaçao à vapor	300, **600**	P G ..	X	0.40	4.00
Portugal CSP [11]	CSP	160	Empreza Nacional de Navegaçao à vapor	300, 450, **600**	P G ..	N	0.40	4.00
Republica CTE	CTE	—	Navy	—	O	—	—	—
San Gabriel	CTD	150	Navy	300, 450, **600**	O	N	—	—
San Miguel [11]	CSS	100–150	Empreza Insulana de Navegaçao, à vapor	300, **600**	P G ..	X	0.40	4.00
Tejo	CTI	—	Navy	—	O	—	—	—
Vasco da Gama	CTB	150	Navy	300, 450, **600**	O	N	—	—
Vulcano CTM	CTM	—	Navy	—	O	—	—	—
Zaire [11]	CSZ	100–150	Empreza Nacional de Navegaçao à vapor	300, **600**	P G ..	X	0.40	4.00
ROUMANIA								
Dacia CVD [80]	CVD	240	Government Marine Department	600	P R [67] ..	N	0.30	3.00
Imparatul Traian [80]	CVF	240	Government Marine Department	600	P R [67] ..	N	0.30	3.00
Principesa Maria [80]	CVM	240	Government Marine Department	600	P R [67] ..	N	0.30	3.00
Regele Carol I. [80]	CVC	240	Government Marine Department	600	P R [67] ..	N	0.30	3.00
Romania [80]	CVR	240	Government Marine Department	600	P R [67] ..	N	0.30	3.00
RUSSIA						Time of **Petrograd**		
Admiral Makharoff	RGK	—	Navy	—	O	—	—	—
Admiral Zavoïko [80]	RNZ	125	Administration of the Province of Kamchatka	300, **600**	P G ..	8 a.m. to 9 a.m., 3 p.m. to 4 p.m., 10 p.m. to 11 p.m.	0.40	—
Afon [80]	RPA	450	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G ..	Midday to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Aleksandria [4]	RFI	—	Government	—	O	—	—	—
Almaz	RKU	—	Navy	—	O	—	—	—
Amour	RGP	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
						Time of Petrograd	Francs.	Francs.
RUSSIA—*contd.*								
Anadyr	RJS	—	Navy	—	O	—	—	—
Andrei Pervozvannyi	RGB	—	Navy	—	O	—	—	—
Angara	RIB	—	Navy	—	O	—	—	—
Askold	RMA	—	Navy	—	O	—	—	—
Avrora	RGO	—	Navy	—	O	—	—	—
Baian	RGJ	—	Navy	—	O	—	—	—
Berezan	RKZ	—	Navy	—	O	—	—	—
Bobr	RGW	—	Navy	—	O	—	—	—
Bogatyr	RGM	—	Navy	—	O	—	—	—
Cherson [80]	RNJ	250	Volunteer Fleet	300, **600**	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Dobrovolets	RHO	—	Navy	—	O	—	—	—
Donskoi Kazak	RHW	—	Navy	—	O	—	—	—
Dounaii	RKW	—	Navy	—	O	—	—	—
Dwinsk [80]	RDK	—	Russian East Asiatic Co.	300, **600**	—	—	—	—
Eclips [80]	REE	430	Department of Marine	300, **600**, 900	P	X	0.40 [69]	— [69]
Emir Boukharskii	RHK	—	Navy	—	O	—	—	—
Ennissey	RGQ	—	Navy	—	O	—	—	—
Erivan [80]	RNQ	350	Volunteer Fleet	300, **600**	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Ekatérinoslav [80]	RNH	250	Volunteer Fleet	300, **600**	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Euphrate RPD [80]	RPD	450	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	2 a.m. to 4 a.m.,[70] midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Evstafii	RKA	—	Navy	—	O	—	—	—
Finn	RHL	—	Navy	—	O	—	—	—
Gaidamak	RHQ	—	Navy	—	O	—	—	—
General Kondratienko	RHC	—	Navy	—	O	—	—	—
Gheorgii Pobedonosetz	RKI	—	Navy	—	O	—	—	—
Gromoboi	RGI	—	Navy	—	O	—	—	—
Guiliak	RGZ	—	Navy	—	O	—	—	—
[illegible] [80]	RHE	430	Department of Marine	300, **600**, 900	P	X	0.40 [69]	— [69]
[illegible]	[illegible]	[illegible]	[illegible]	300, **600**	P G	5 a.m. to 8 a.m., [illegible]	0.40 [69]	— [69]

[illegible]	[illegible]	450	Cie Russe de Nav. à vapeur et de	300, 600	P G ..	midday to 2 p.m., 6 p.m. to 8 p.m.		
Imperator Nicolaï I.[80] ..	RPM	450	**Cie Russe de Nav. à vapeur et de Commerce**	300, 600	P G ..	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Imperator Nicolaï II.[80] ..	RPB	450	Cie Russe de Nav. à vapeur et de Commerce	300, 600	P G ..	Midday to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Imperator Pavel I.	RGC	—	Navy	—	O	—	—	—
Imperator Piotre Véliki[80] ..	RPP	450	**Cie Russe de Nav. à vapeur et de Commerce**	300, 600	PG ..	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Imperatriza Ekatérina II.[80] ..	RPS	450	**Cie Russe de Nav. à vapeur et de Commerce**	300, 600	P G ..	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Ioann Zlatooust	RKC	—	Navy	—	O	—	—	—
Iolanda[4]	—	200	**Madame Elisabeth Terestchenko** ..	300, 600	P G ..	X	0.40	—
Irtych[80]	ROJ	60	Volunteer Fleet	300, 600	P G ..	7 a.m. to 10 a.m., 1 p.m. to 5 p.m., 7 p.m. to midnight	0.40 [69]	— [69]
Jérusalem[80]	RPI	450	Cie Russe de Nav. à vapeur et de Commerce	300, 600	P G ..	**Midday** to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.[70]	0.40 [69]	— [69]
Kagoul	RKM	—	Navy	—	O	—	—	—
Kama	RID	—	Navy	—	O	—	—	—
Kamenetz-Podolsk[80]	ROP	170	Volunteer Fleet	300, 600	P G ..	7 a.m. to 10 a.m., 1 p.m. to 5 p.m. 7 p.m. to midnight.	0.40 [69]	— [69]
Kapitan Leitenant Baranoff ..	RLE	—	Navy	—	O	—	—	—
Kapitan Saken	RLC	—	Navy	—	O	—	—	—
Kazanets	RHU	—	Navy	—	O	—	—	—
Khrabryi	RGU	—	Navy	—	O	—	—	—
Kiev[80]	RNK	250	**Volunteer Fleet**	300, 600	**P** .. .. (provisionally)	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m to 11 p.m.	0.40 [69]	— [69]
Kishinev[80]	RNC	250	**Volunteer Fleet**	300, 600	P G ..	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Koreets	RGV	—	Navy	—	O	—	—	—
Koroléva **Olga**[80]	RPL	450	Cie Russe de Nav. **à** vapeur et de Commerce	300, 600	P G ..	Midday to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Koursk RNY[80]	RNY	250	**Volunteer Fleet**	300, 600	P G ..	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Koursk RSK[80]	RSK	180	Cie Russe de Nav. **à vapeur** de l'Asie Orientale	300, 600	P G ..	N	0.40 [69]	— [69]
Kronstadt	RKX	—	Navy	—	O	—	—	—
Leitenant Chestakoff	RLB	—	Navy	—	O	—	—	—
Leitenant Zatsarennyi ..	RLD	—	Navy	—	O	—	—	—
Mandjour	RMF	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
RUSSIA—*contd.*						Time of Petrograd	Francs.	Francs.
Mangougai	RME	—	Navy	—	O	—	—	—
Mezen	RIJ	—	Navy	—	O	—	—	—
Mitawa [80]	RSA	200	Cie Russe de Nav. à vapeur de l'Asie Orientale	300, **600**	P G	N	0.40 [69]	— [69]
Mohilev [80]	RNM	**250**	**Volunteer Fleet**	300, **600**	**P G**	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Moskvitianin	RHN	—	Navy	—	O	—	—	—
Neva	**RFF**	—	Navy	—	O	—	—	—
Nijni Novgorod [80]	RNE	**250**	Volunteer Fleet	300, **600**	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Nikolaeff	RGT	—	Navy	—	O	—	—	—
Novgorod [80]	RNP	250	**Volunteer Fleet**	300, **600**	**P G**	5 a.m. to 8 a.m, 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Novik	RHA	—	Navy	—	O	—	—	—
Odessa [80]	RPE	450	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	Midday to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Oka	RIC	—	Navy	—	O	—	—	—
Okean	RGR	—	Navy	—	O	—	—	—
Okhotnik	RHF	—	Navy	—	O	—	—	—
Oleg	RGN	—	Navy	—	O	—	—	—
Omsk [80]	ROM	170	Volunteer Fleet	300, **600**	P G	7 a.m. to 10 a.m., 1 p.m. to 5 p.m., 7 p.m. to midnight	0.40 [69]	— [69]
Oukraina	RHT	—	Navy	—	O	—	—	—
Ouraletz	RKP	—	Navy	—	O	—	—	—
Oussouriets	RHR	—	Navy	—	O	—	—	—
Oussourri	RMD	—	Navy	—	O	—	—	—
Pamiat Merkouria	RKL	—	Navy	—	O	—	—	—
Panteleimon	RKD	—	Navy	—	O	—	—	—
Pechora	RIE	—	Navy	—	O	—	—	—
Piotre Véliki [80]	RPR	110	Committee of the Riga Stock Exchange	300, **600**	P G	— [71]	0.40	—
Pogranitchnik	RHI	—	Navy	—	O	—	—	—
[illegible]	[illegible]	[illegible]	Cie Russe de Nav. à vapeur et de	300, **600**	P G	**Midday** to 2 p.m., 6 p.m. to 8 p.m.,	0.40 [69]	— [69]

Poliarnaia Zviezda [illegible] bourgskaia	[illegible]	300	Cie Russe de Nav. à vapeur et de Commerce	300, 600	P G	Midday to 2 p.m.,[70] 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Riga	RIK	—	Navy	—	O	—	—	—
Rossia RGL	RGL	—	Navy	—	O	—	—	—
Rossia RSR [80]	RSR	200	Cie Russe de Nav. à vapeur de l'Asie Orientale	300, 600	P G	N	0.40 [69]	— [69]
Rostislav	RKF	—	Navy	—	O	—	—	—
Rurik	RGA	—	Navy	—	O	—	—	—
Sibirskij strelok	RHB	—	Navy	—	O	—	—	—
Sinop	RKG	—	Navy	—	O	—	—	—
Slava	RGH	—	Navy	—	O	—	—	—
Soukhona	RIG	—	Navy	—	O	—	—	—
Soutchan [80]	ROS	60	Volunteer Fleet	300, 450, 600	P G	7 a.m. to 10 a.m., 1 p.m. to 5 p.m., 7 p.m. to midnight	0.40 [69]	— [69]
Ssaratov [80]	**RNG**	**250**	**Volunteer Fleet**	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Standart [4]	RFB	—	Government	—	O	—	—	—
Stavropol [80]	RNS	100	Volunteer Fleet	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Steregouchtii	RHZ	—	Navy	—	O	—	—	—
Strachnyi	RHV	—	Navy	—	O	—	—	—
Stréla	RFG	—	Navy	—	O	—	—	—
Sviatoi Nicolai [80]	RPX	300	Cie Russe de Nav. à vapeur et de Commerce.	300, 600	P G	Midday to 2 p.m.,[70] 6 p.m. to 8 p.m., 2 a.m to 4 a.m.	0.40 [69]	— [69]
Taimir	RMH	—	Navy	—	O	—	—	—
Tambov [80]	**RNW**	**250**	**Volunteer Fleet**	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Tchikhatcheff [80]	RPC	450	Cie Russe de Nav. à vapeur et de Commerce	300, 600	P G	Midday to 2 p.m., 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Teretz	RKT	—	Navy	—	O	—	—	—
Tigre [80]	RPT	450	Cie Russe de Nav. à vapeur et de Commerce	300, 600	P G	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Toula [80]	**RNB**	**250**	**Volunteer Fleet**	300, 600	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Tourkmen Stavropolskii	RHS	—	Navy	—	O	—	—	—
Tri Sviatitelia	RKE	—	Navy	—	O	—	—	—
Tsar [80]	RSC	160	Cie Russe de Nav. à vapeur de l'Asie Orientale	300, 600	P G	N	0.40 [69]	— [69]
Tsar Mikhail Fédorovitch [80]	RPV	450	Cie Russe de Nav. à vapeur et de Commerce	300, 600	P G	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Tsesarevitch	RGFJ	—	Navy	—	O	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
RUSSIA—*contd.*						Time of Petrograd.	Francs.	Francs.
Tséssarevitch Aléxey Nikolaievitch [80]	RPY	300	**Cie Russe de Nav. à vapeur et de Commerce**	300, **600**	P G	2 a.m. to 4 a.m., midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Tséssarévitch Gueorgui [80]	RPF	300	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	2 a.m. to 4 a.m.,[70] midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Tver [80]	RNT	210	Volunteer Fleet	300, **600**	P G	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Vaiguatch	RML	—	Navy	—	O	—	—	—
Vélikaïa-Kniaguinia-Xénia [80]	RPG	300	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	Midday to 2 p.m.,[70] 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Vélikaïa Kniaguinia Xénia Alexandrovna	ROD	300	**Commercial Nav. School, Odessa**	300, **600**	P G	2 p.m. to 3 p.m., 8 p.m. to 9 p.m.	—	—
Vélikaia Kniajna Maria Nikolaievna	RNI	**200**	**Volunteer Fleet (Training ship)**	600	P	X	0.40 [69]	— [69]
Véliki-Kniaz Alexandre [80]	RPW	300	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	Midday to 2 p.m.,[70] 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Véliki-Kniaz Alexii [80]	RPQ	300	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	Midday to 2 p.m.,[70] 6 p.m. to 8 p.m., 2 a.m. to 4 a.m.	0.40 [69]	— [69]
Véliki-Kniaz Constantine [80]	RPO	300	Cie Russe de Nav. à vapeur et de Commerce	300, **600**	P G	2 a.m. to 4 a.m.,[70] midday to 2 p.m., 6 p.m. to 8 p.m.	0.40 [69]	— [69]
Vladimir [80]	RNV	**250**	**Volunteer Fleet**	300, **600**	**P G**	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Voiskovoi	RIA	—	Navy	—	O	—	—	—
Vologda [80]	RND	170	Volunteer Fleet	300, **600**	P G	7 a.m. to 10 a.m., 1 p.m. to 5 p.m., 7 p.m. to midnight.	0.40 [69]	— [69]
Voronège [80]	RNX	**250**	**Volunteer Fleet**	300, **600**	**P G**	5 a.m. to 8 a.m., 1 p.m. to 3 p.m., 8 p.m. to 11 p.m.	0.40 [69]	— [69]
Vsadnik	RHP	—	Navy	—	O	—	—	—
Zabaikalets	RHX	—	Navy	—	O	—	—	—

Bali	HGC	—	Government	300, 600	O	—	—	—
Sua Kamrensindbu	HGE	—	Government	300, 600	O	—	—	—
Sua Tayanchol..	HGD	—	Government	300, 600	O	—	—	—
SOUTH AFRICA (UNION OF)								
Ludwig Wiener [114]	VNA	100	Government	300, 600	O .. .	—	—	—
SPAIN								
Adolfo [11]	EEY	150–200	Adolfo Pardo	300, 600	P G ..	X	0.30	3.00
A. Lazaro [80]	EEL	180	Cie Valencia de Vap. Correos de Africa	300, 450, 600	P G ..	—[72]	0.30	3.00
Alfonso XII. [11]..	EDD	269	Compañia Trasatlántica ..	300, 600	P G ..	N	0.30	3.00
Alfonso XIII. EBB	EBB	550	Navy	600, 900, 1,200 1,500, 1,800	O	N	—	—
Alfonso XIII. EDT [11] ..	EDT	269	Compañia Trasatlántica ..	300, 600	P G ..	N	0.30	3.00
Alicante [11]	EDA	269	Compañia Trasatlántica ..	300, 600	P G ..	N	0.30	3.00
Almirante Lobo [138]	EBN	140	Government	300, 600, 900	O	N	—	—
Alvaro de Bazán	EBM	81	Navy	300, 600	O	N	—	—
Angel B. Perez [11]	ECD	100–150	A. F. Perez..	300, 600	P G ..	X	0.30	3.00
Antonio Lopez [11]	EDL	269	Compañia Trasatlántica ..	300, 600	P G ..	N	0.30	3.00
Atlante [68]	EFA	—	Soc. Navegaçion é Industria ..	300, 600	P G ..	X	0.30	3.00
Auxias March [80]	EEA	180	Cia Valencia de Vap. Correos de Africa	300 450, 600	P G ..	—[11]	0.30	3.00
Balear [80]	EFR	100	Isleña Marítima Compañia ..	300, 450, 600	P	X	—	—
Balmes [11]	ECA	275	Pinillos Izquierdo y Compañia ...	300, 450, 600	P G ..	N	0.30	3.00
Barcelo [80]	EEB	180	Cia Valencia de Vap. Correos de Africa	300, 450, 600	P G ..	—[72]	0.30	3.00
Barcelona ECB [11]	ECB	300	Pinillos Izquierdo y Compañia ..	300, 450, 600	P G ..	N	0.30	3.00
Bellver [80]	EFB	200	Isleña Marítima Compañia ..	300, 400, 600	P	X	—	—
Bonifaz	EBR	220	Navy	300, 450, 600, 900	O	N	—	—
Buenos Aires EDB [11] ..	EDB	269	Compañia Trasatlántica	300, 600	P G ..	N	0.30	3.00
Bustamante	EBO	140	Navy	300, 450, 600, 900	O	N	—	—
Cabañal [86]	EEC	180	Cia Valencia de Vap. Correos de Africa	300, 450, 600	P G ..	—[72]	0.30	3.00
Cadarso..	EBQ	140	Navy	300, 450, 600, 900	O	N	—	—
Cadiz [11]..	ECC	300	Pinillos Izquierdo y Compañia ..	300, 450, 600,	P G ..	N	0.30	3.00
Canalejas [80]	EEK	100	Cia Valencia de Vap. Correos de Africa	300, 600	P G ..	—[72]	0.30	3.00
Carolina E. de Perez [11] ..	ECF	100–150	A. F. Perez	300, 600	P G ..	X	0.30	3.00
Catalina [11]	ECT	300	Pinillos Izquierdo y Compañia ..	300, 450, 600	P G ..	N	0.30	3.00
Cataluña EBF	EBF	216	Navy	300, 450, 550	O	N	—	—
Cataluña EDC [11]	EDC	108	Compañia Trasatlántica	300, 600	P G ..	N	0.30	3.00
Cataluña EFC [80]	EFC	100	Isleña Marítima Compañia ..	300, 400, 600	P	X	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
SPAIN—*contd.*							Francs.	Francs.
C. de Eizaguirre [11]	EDE	269	Compañia Trasatlántica	300, **600**	P G	N	0.30	3.00
Ciudad de Cadiz [11]	EDZ	108	Compañia Trasatlántica	300, **600**	P G	N	0.30	3.00
C. Lopez y Lopez [11]	EDH	269	Compañia Trasatlántica	300, **600**	P G	N	0.30	3.00
Conde Wifredo [11]	ECW	300	Pinillos Izquierdo y Compañia	300, 450, **600**	P G	N	0.30	3.00
Delfin [68]	EFD	—	Soc. Navegaçion é Industria	300, **600**	P G	—	0.30	3.00
Emilia S. de Perez [11]	ECE	100–150	A. F. Perez	300, **600**	P G	X	0.30	3.00
Emperador Carlos V.	EBE	243	Navy	300, **750**	O	N	—	—
España	EBA	550	Navy	600, **900**, **1,200**, 1,500, 1,800	O	N	—	—
Extremadura EBJ	EBJ	43	Navy	**300**, 525	O	N	—	—
Francoli [11]	EFF	130	Linea de Vap. Tintoré	300, **600**	P G	N	0.30	3.00
Fuerteventura [11]	EFY	150	Cia de Vapores Correos Interinsulares Canarios	300, **600**	P G	N	0.30	3.00
General Fernandez Silvestre [80]	EEN	120	Cia Valencia de Vap. Correos de Africa	300 **600**	P G	8 a.m. to 4 p.m., 8 p.m. to midnight	0.30	3.00
Giralda [4]	EBI	270	Government	300, 500, **600**, 1,000	O	N	—	—
Grao [80]	EEG	100	Cia Valencia de Vap. Correos de Africa	300, **600**	P G	—[72]	0.30	3.00
Hesperides EFH [68]	EFH	300	Soc. Navegaçion é Industria	300, 450, **600**	P G	N	0.30	3.00
Ines [11]	ECI	100–150	Adolfo Pardo	300, **600**	P G	X	0.30	3.00
Infanta Isabel de Borbon [11]	EDI	431	Compañia Trasatlántica	300, **600**	P G	N	0.30	3.00
Infanta Isabel EBL	EBL	216	Navy	**300**, 450	O	N	—	—
Infanta Isabel ECY [11]	ECY	300	Pinillos Izquierdo y Compañia	300, 450, **600**	P G	N	0.30	3.00
Isla de Menorca [80]	EFO	—	La Marítima cia Mahonesa	300, **600**	P G	—	0.30	3.00
Isla de Panay [11]	EDP	269	Compañia Trasatlántica	300, **600**	P G	N	0.30	3.00
Isleño [80]	EFI	100	Isleña Marítima Compañia	300, 450, **600**	P	X	—	—
Jaime I.	EBC	550	Navy	600, **900**, **1,200**, 1,500, 1,800	O	N	—	—
Jativa [80]	EEI	100	Cia Valencia de Vap. Correos de Africa	300, **600**	P G	—[72]	0.30	3.00
J. B. Llovera [80]	EEH	100	Cia Valencia de Vap. Correos de Africa	300, **600**	P G	—[72]	0.30	3.00
Jorge Juan [80]	EEJ	180	Cia Valencia de Vap. Correos de Africa	300, **600**	P G	—[72]	0.30	3.00
J. S. Sister	EES	180	Cia Valencia de Vap. Correos de Africa	300, **600**	P G	—[72]	0.30	3.00
[illegible]	EBS	220	Navy	300, **450**, **600**.	O	N	—	—

				[illegible], 900	O ..	N	—	—
Legazpi [11]	EDG	269	Compañia Trasatlántica	300, 450, 600	P G	N	0.30	3.00
Leon XIII. [11]	EDO	431	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Luis Vives [80]	EEV	180	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00
Lulio [80]	EFL	100	Isleña Marítima Compañia	300, 450, 600	P ..	X	—	—
Mahon [80]	EFN	—	La Maritima cia Mahonesa	300, 600	P G	—	0.30	3.00
Mallorca [80]	EFK	200	Isleña Marítima Compañia	300, 450, 600	P ..	X	0.30	3.00
Manuel Calvo [11]	EDM	269	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Manuel L. Villaverde [11]	EDW	108	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Martin Saenz [11]	ECZ	300	Pinillos Izquierdo y Compañia	300, 450, 600	P G	N	0.30	3.00
Menorquin [80]	EFQ	—	La Maritima cia Mahonesa	300, 600	P G	—	0.30	3.00
Miguel M. Pinillos [11]	ECP	300	Pinillos Izquierdo y Compañia	300, 450, 600	P G	N	0.30	3.00
Miramar EFM [80]	EFM	200	Isleña Marítima Compañia	300, 400, 600	P ..	X	—	—
Monté Toro [80]	EFT	—	La Maritima cia Mahonesa	300, 600	P G	—	0.30	3.00
Montevideo EDV [11]	EDV	269	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Montserrat [11]	EDN	269	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Nautilus EBV	EBV	140	Navy	600, 900, 1,200	O ..	N	—	—
Norden [80]	EFZ	100	Achalandabaso Gascué y Compañia	300, 600	P ..	X	—	—
Pelayo	EBD	270	Navy	300, 600, 900 1,200	O ..	N	—	—
Princesa de Asturias	EBG	324	Navy	300, 600, 800 1,000	O ..	N	—	—
P. de Satrustegui [11]	EDS	431	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Recalde	EBU	220	Navy	300, 450, 600, 900	O ..	N	—	—
Reina Maria Cristina [11]	EDK	431	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Reina Regente	EBH	270	Navy	300, 600, 700 1,000	O ..	N	—	—
Reina Victoria [68]	EFV	300	Soc. Navegaçion é Industria	300, 450, 600	P G	N	0.30	3.00
Reina Victoria Eugenia [11]	EDU	431	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Rey Jaime I. [80]	EFJ	200	Isleña Marítima Compañia	300, 400, 600	P ..	X	—	—
Rey Jaime II. [80]	EFS	200	Isleña Marítima Compañia	300, 450, 600	P ..	X	—	—
Rio de la Plata EBK	EBK	—	Navy	—	O ..	N	—	—
Sagunto [80]	EEO	180	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00
Santa Isabel [11]	EDJ	270	Compañia Trasatlántica	300, 600	P G	N	0.30	3.00
Teodoro Llorente [80]	EET	100	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00
Tirso [80]	EFX	80	Linea de Vap. Tintoré	300, 600	P ..	—	—	—
Torreblanca [11]	EFP	130	Linea de Vap. Tintoré	300, 600	P G	X	0.30	3.00
Turia [11]	EFU	250	Linea de Vap. Tintoré	300, 450, 600	P G	N	0.30	3.00
Valbanera [11]	ECV	300	Pinillos Izquierdo y Compañia	300, 450, 600	P G	N	0.30	3.00
Vicente Ferrer [80]	EEF	100	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00
Vicente La Roda [80]	EER	180	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00
Villaamil	EBP	140	Navy	300, 450, 600, 900	O ..	N	—	—
Villarreal [80]	EEW	180	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00
V. Puchol [80]	EEP	180	Cia Valencia de Vap. Correos de Africa	300, 600	P G	—[72]	0.30	3.00

Ship Stations—*Continued*

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SWEDEN								
Abisko [68]	**SFL**	**150**	Trafikaktiebolaget Grängesberg-Oxelösund	300, 450, **600**	**P** ..	Greenwich time. 8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	Francs. 0.40	Francs. 4.00
Africanic [68]	**SFS**	**250**	Rederiaktiebolaget Transatlantic (Gothenburg-South Africa Line)	300, **600**	**P**	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Åran	SBH	—	Navy	—	O ..	—	—	—
Atlantic [68]	**SFT**	**250**	Rederiaktiebolaget Transatlantic (Gothenburg-South Africa Line)	300, **600**	**P** ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Australic [68]	SFH	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, **600**, 1,800	P ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Axel Johnson [80]	SGK	**350**	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, **600**	P ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	**0.28**	2.80
Balder [80]	SGO	200	Reder, Svenska Lloyd (Sweden-Great Britain Line)	300, **600**	P G	N	0.40	2.80
Baltic SFU [68]	**SFU**	**250**	Rederiaktiebolaget Transatlantic (Gothenburg-South Africa Line)	300, **600**	**P** ..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
[illegible] [80]	SGP	200	Reder. Svenska Lloyd (Sweden-	300, **600**	P G	N	0.40	2.80

Bia[68]	SFR	250	Rederiaktiebolaget Transatlantic	300, 600	P	7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight		
Blenda	SBX	—	Navy	—	O	—	—	—
Boden[68]	SFW	150	Trafikaktiebolaget Grängesberg-Oxelösund	300, 600	P	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Carlsholm[68]	SGR	350	Svenska Amerika-Mexico Linjen	300, 600	P G	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.40	4.00
Claes Horn	SBQ	—	Navy	—	O	—	—	—
Clas Flemming	SCI	—	Navy	—	O	—	—	—
Clas Uggla	SBR	—	Navy	—	O	—	—	—
Dristigheten	SBG	—	Navy	—	O	—	—	—
Drott[4]	SBW	—	Government	—	O	—	—	—
Drottning Viktoria[36 80]	SEB	100	State Railways (Sassnitz-Trälle-borg Line)	300, 375, 600	P R,[35] O[34]	X	—[37]	—[37]
Edda	SBV	—	Navy	—	O	—	—	—
Formosa[68]	SGA	350	Swedish East Asiatic Co.	300, 600	P G	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.40	4.00
Fylgia	SBM	—	Navy	—	O	—	—	—
Göta	SBB	—	Navy	—	O	—	—	—
Heimdall SGH[80]	SGH	160	Stockholm Rederiaktiebolaget Svea	300, 600	P	3 a.m. to 4 a.m. 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight.	0.28	2.80
Hellenic[68]	SFF	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, 600, 1,800	P	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Hugin	SCE	—	Navy	—	O	—	—	—
Indianic[68]	SFE	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, 600, 1,800	P	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Jacob Bagge	SBP	—	Navy	—	O	—	—	—
John Ericsson	SBN	—	Navy	—	O	—	—	—
Konung Gustaf V.[36 80]	SEA	100	State Railways (Sassnitz-Trälle-borg Line)	300, 375, 600	P R[35] O[34]	X	—[37]	—[37]

Ship Stations—*Continued*

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SWEDEN—*contd.*						Greenwich time.	Francs.	Francs.
Kratos [68]	SFQ	250	Rederiaktiebolaget Transatlantic (Gothenburg-South Africa Line)	300, **600**	P	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight.	0.40	4.00
Kronprinsessan Margareta [80 81]	SFY	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, **600**	P	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Kronprinsessan Victoria [80]	SGB	350	Rederaktiebolaget Nordstjernan (Johnson Line)	300, **600**	P	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Kronprins Gustaf Adolf [80 81]	SFV	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, **600**	P	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Magne	SBZ	—	Navy	—	O	—	—	—
Manligheten	SBK	—	Navy	—	O	—	—	—
Mode	SBY	—	Navy	—	O	—	—	—
Munin	SCF	—	Navy	—	O	—	—	—
Narvik [68]	**SFX**	150	Trafikaktiebolaget Grängesberg-Oxelösund	300, **600**	P	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Niord	SBF	—	Navy	—	O	—	—	—
Nordic [68]	SGG	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, **600**	P	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight.	0.40	4.00
Oaxen V. [80 114]	SGN	100	Aktiebolaget Karta & Oaxens Kalkbruk	300, **600**	P	X	—	—
Oden	SBD	—	Navy	—	O	—	—	—

Pacific SFZ [80] [91]	SFZ	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Pedro Christophersen [80] [91] ..	SGE	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Psilander	SBS	—	Navy	—	O ..	..	—	—	—
Ragnar	SCB	—	Navy	—	O ..	..	—	—	—
Rota	SBT	—	Navy	—	O ..	..	—	—	—
Saga SFB [80]	SFB	150	Angfartygsaktiebolaget Thule ..	300, 600	P G	..	N	0.28	2.80
Sagoland [68]	SGM	350	Angfartygsaktiebolaget Tirfing ..	300, 600	P ..	..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.40	4.00
San Francisco SGC [80] [91] ..	SGC	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, 600	P ..	..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Scandinavic [68]	SGI	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight.	0.40	4.00
Sigurd	SCC	—	Navy	—	O ..	..	—	—	—
Siljan [68]	SGJ	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, 600	P ..	..	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight.	0.40	4.00
Sir Ernest Cassel [68]	SFP	150	Trafikaktiebolaget Grängesberg-Oxelösund	300, 600	P ..	..	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Skagerak [80] [118]	SEC	70	Government	300, 600	P ..	..	6.30 a.m. to 7.30 a.m., 9.30 a.m. to 11.30 a.m., 2.30 p.m. to 3.30 p.m., 4.30 p.m. to 5.30 p.m.	—	—
Skäggald	SCJ	—	Navy	—	O ..	..	—	—	—
Skuld	SBU	—	Navy	—	O ..	..	—	—	—
Stockholm [11]	SGL	250	Rederiaktiebolaget Sverige-ord-amerika (Gothenburg-New York Line)	300, 600	P G	..	N	0.40	4.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles	Shipping Linc or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge.	
							Per Word.	Minimum Charge.
						Greenwich time.	Francs.	Francs.
SWEDEN—*contd.*								
Suecia [80] [91]	SGT	350	Rederiaktiebolaget Nordstjernan (Johnson Line)	300, **600**	P G ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.28	2.80
Sumatra SGD [66]	SGD	350	Swedish East Asiatic Co... ..	300, **600**	P G ..	6 a.m. to 7 a.m., 11 a.m. to midday, 2 p.m. to 3 p.m., 6 p.m. to 7 p.m.	0.40	4.00
Svea	SBA	—	Navy	—	O	—	—	—
Svensksund	SCK	—	Navy	—	O	—	—	—
Sverige	SCL	—	Navy	—	O	—	—	—
Sydic [68]	SGF	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, **600**	P	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight.	0.40	4.00
Tapperheten	SBJ	—	Navy	—	O	—	—	—
Tasmanic [68]	SFG	250	Rederiaktiebolaget Transatlantic (Gothenburg-Australia Line)	300, **600**, 1,800	P	3 a.m. to 4 a.m., 7 a.m. to 8 a.m., 11 a.m. to midday, 3 p.m. to 4 p.m., 7 p.m. to 8 p.m., 11 p.m. to midnight	0.40	4.00
Texas SFD [68]	SFD	200	Svenska Amerika-Mexico Linjen ..	300, **600**	P	Midnight to 12.15 a.m., 4 a.m. to 4.15 a.m., 8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m to 8.15 p.m.	0.40	4.00
Thor	SBE	—	Navy	—	O	—	—	—
Thordön	SCH	—	Navy	—	O	—	—	—
Thorsten [80]	SGQ	200	Reder. Svenska Lloyd (Sweden-Great Britain Line)	300, **600**	P G ..	N	0.40	2.80
Thule SBC	SBC	—	Navy	—	O	—	—	—
	[illegible]	[illegible]	…aktiebolaget Thule	300, **600**	P G ..	N	0.28	2.80

Tirfing	SCG	—	Na... Oxelösund	300, 450, 600	P	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Vidar	SCD	—	Navy	—	O	—	—	—
Vollrath Tham [69]	SFO	150	Trafikaktiebolaget Grängesberg-Oxelösund	300, 600	P	8 a.m. to 8.15 a.m., midday to 12.15 p.m., 4 p.m. to 4.15 p.m., 8 p.m. to 8.15 p.m.	0.40	4.00
Wale	SCA	—	Navy	—	O	—	—	—
Wasa	SBI	—	Navy	—	O	—	—	—
UNITED STATES OF AMERICA								
A. 2 NXB [125]	NXB	—	Navy	300, **600**	P G	N	0.20	2.00
A. 3 NXC [125]	NXC	—	Navy	300, **600**	P G	N	0.20	2.00
A. 4 NXD [125]	NXD	—	Navy	300, **600**	P G	N	0.20	2.00
A. 5 NXE [125]	NXE	—	Navy	300, **600**	P G	N	0.20	2.00
A. 6 NXF [125]	NXF	—	Navy	300, **600**	P G	N	0.20	2.00
A. 7 NXG [125]	NXG	—	Navy	300, **600**	P G	N	0.20	2.00
Abangarez [113]	KDI	500	Abangarez Steamship Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Abarenda [125]	NOB	—	Navy	600	P G	—	0.20 [124]	2.00 [124]
A. C. Bedford [76]	KNZ	—	Standard Oil Co. (New Jersey)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Accomac [125]	NTH	—	Navy	300, **600**	P G	N	0.20	2.00
Achilles KPT [80]	KPT	500	Panama Railroad Co.	300, 450, **600**, 750, 950, 1,200	P G	N	0.20	2.00
Acme [76]	KIJ	150	Standard Transportation Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Active NTJ [125]	NTJ	—	Navy	300, **600**	P G	N	0.20	2.00
Acushnet [127]	NRU	75	U.S. Revenue Cutter Service	**300**, 600	P G	N	0.20	2.00
Adams [125]	NTI	—	Navy	300, **600**	P G	N	0.20	2.00
Adeline Smith [76]	WHS	150	Inter-Ocean Transportation Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Admiral Dewey [80]	WAY	100	Pacific Alaska Nav. Co.	300, **600**	P G	N	0.20	2.00
Admiral Evans [80]	WAB	250	Pacific Alaska Nav. Co.	300, **600**	P G	N	—	—
Admiral Farragut [80]	WAF	100	Pacific Alaska Nav. Co.	300, 450, 515, **600**	—	N	0.20	2.00
Admiral Goodrich [80]	WRJ	200	Pacific Alaska Nav. Co.	300, 440, 520, **600**	P G	N	0.20	2.00
Admiral Schley [80]	WAZ	100	Pacific Alaska Nav. Co.	300, **600**	P G	N	0.20	2.00
Admiral Watson [80]	WAW	150	Pacific Alaska Nav. Co.	300, 450, **600**	P G	N	0.20	2.00
Advance [80]	KMV	300	Panama Railroad Co.	300, 450, **600**	P G	N	0.20	2.00
Aileen [125]	NVO	—	Navy	300, **600**	P G	N	0.20	2.00
Ajax NBH [125]	NBH	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Alabama KUN [76]	KUN	200	The Texas Co.	300, **600**	P G	X	0.20	2.00
Alabama NBI [125]	NBI	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Alabama WFB [105, 76]	WFB	150	Goodrich Transit Co.	300, **600**	P G	N	0.10	1.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Alamance [80]	WKZ	200	Garland Steamship Corporation	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Alameda [80]	WAA	100	Alaska S.S. Co.	300, **600**	P G	N	0.20	2.00
Alamo [76]	KEJ	200	Mallory S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Alaska [80]	WWS	150	Alaska S.S. Co.	300, 435, 510, **600**	P G	N	0.20	2.00
Alaskan [80]	WKA	200	American Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Albany NBJ [125]	NBJ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Albatross NQY [125]	NQY	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Alberta KZA [4 76]	KZA	200	Fred Gilbert Bourne	300, **600** 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Alert NBL [125]	NBL	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Algonquin KVG [76]	KVG	200	Clyde S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Algonquin NRA [127]	NRA	150	U.S. Revenue Cutter Service	300, **600**	P G	N	0.20	2.00
Alice NTM [125]	NTM	—	Navy	300, **600**	P G	N	0.20	2.00
Alicia [4 80]	KZB	60	Alfred I. du Pont	300, **600**	P G	X	0.20	2.00
Al-Ki [76]	WNK	100	Northland S.S. Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Allen [125]	NJD	—	Navy	300, **600**	P G	N	0.20	2.00
Allianca [80]	KMA	300	Panama Railroad Co.	300, 450, **600**	P G	N	0.20	2.00
Alliance [76]	WRV	100	North Pacific S.S. Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Almirante [113]	KLD	500	Almirante S.S. Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Aloha [4 80]	KYH	200	Arthur Curtiss James	300, 450, **600**	P G	X	0.20	2.00
Alpena [76 107]	WCS	—	Wyandotte Transportation Co.	300,**600**	P G	—	0.10	1.00
Alvina [80]	WEY	300	Thomas F. Cole	300, **600**	P ..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Amazonia [76]	KOO	200	R. Lawrence Smith (Inc.)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
American WKF [80]	WKF	200	American Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Ammen [125]	NBP	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Amolco [80]	KMB	—	Boston Molasses Co.	300, **600**	P G	X	0.40	4.00
Amphitrite NHG	NHG	—	Naval Militia	300, **600**	—	—	—	—
A... [80]	KMS	...	Panama Railroad Co.	300, 400, **600**	P G	N	0.20	2.00

Ann Arbor No. 3 [105, 123, 76]	WDN	125	Ann Arbor Railroad Co.	300, **600**	P G	X	0.10	1.00
Ann Arbor No. 4 [105, 123, 76]	WDO	125	Ann Arbor Railroad Co.	300 **600**	P G	X	0.10	1.00
Ann Arbor No. 5 [105, 123, 76]	WDP	125	Ann Arbor Railroad Co.	300, **600**	P G	X	0.10	1.00
Ann Arbor No. 6 [105, 123, 76]	WDQ	100	Ann Arbor Railroad Co.	300, **600**	P G	X	0.10	1.00
Anne W.	WMU	—	Hosford Transportation Co.	300, **600**	—	—	—	—
Antilles [76]	KKA	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Apache KVA [76]	KVA	200	Clyde S.S. Co.	300. 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Apache NRP [127]	NRP	100	U.S. Revenue Cutter Service	300, **600**	P G	N	0.20	2.00
Apache NTN [125]	NTN	—	Navy	300, **600**	P G	N	0.20	2.00
Arapahoe KVB [76]	KVB	200	Clyde S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Arapahoe NSP [125]	NSP	—	Navy	300, **600**	P G	N	0.20	2.00
Ardmore [76]	KIA	250	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Arethusa NBU [125]	NBU	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Argyll WTB [131]	WTB	150	Union S.S. Co.	300, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Arizona WFG [76]	WFG	150	Goodrich Transit Co.	300, **600**	P G	X	0.10	1.00
Arizona NBW [125]	NBW	—	Navy	300, **600**	P G	N	0.20	2.00
Arizonan [80]	WKB	350	American Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Arkansas [125]	NBV	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Ashtabula WEZ [107, 76]	WEZ	125	Pennsylvania-Ontario Transpn. Co.	300, **600**	P G	X	0.10	1.00
Astral [76]	KIQ	150	Standard Transportation Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Asuncion WTX [76]	WTX	150	Standard Oil Co., California	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Atenas [113]	KDK	500	Atenas Steamship Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Atlas WTT [76]	WTT	150	Standard Oil Co,. California	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Aylwin [125]	NIH	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Azaiea	NLO	—	U.S. Department of Labor (Immigration Service)	—	—	—	—	—
Aztec KZC [4, 76]	KZC	150	A. C. Burrage	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Aztec WWQ [76]	WWQ	—	Pacific Mail S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
B 1. [125]	NXH	—	Navy	300, **600**	P G	N	0.20	2.00
B 2. [125]	NXI	—	Navy	300, **600**	P G	N	0.20	2.00
B 3. [125]	NXJ	—	Navy	300, **600**	P G	N	0.20	2.00
Bache	NLK	100	Department of Commerce	300, 400, 600	O	X	—	—
Bacoi [76, 91]	KJU	150	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Bagley [125]	NVU	—	Navy	300, **600**	P G	N	0.20	2.00
Bailey [125]	NCF	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Bainbridge [125]	NIA	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Balboa [76]	WHU	—	Columbian Maritime Co.	300, **600**	—	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Balch [125]	NII	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Baltimore [125]	NCH	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Bantu [76]	KLM	200	United States Steel Products Co.	300, **600**	P G	X	0.20	2.00
Barney [125]	NVV	—	Navy	300, **600**	P G	N	0.20	2.00
Barry [125]	NIC	—	Navy	300, **600**	P G	N	0.20	2.00
Baton Rouge [76]	KSG	200	Standard Oil Co. (New Jersey)	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Bayway [76]	KSR	200	Standard Oil Co (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Beale [125]	NCL	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Bear [127]	NRB	150	U.S. Revenue Cutter Service	300, **600**	P G	N	0.20	2.00
Beaver WWB [76]	WWB	200	San Francisco & Portland S.S. Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Belfast [76]	KRD	200	Eastern S.S. Corporation	300, **600**	P G	X	0.20	2.00
Benham [125]	NIJ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Benjamin Brewster [76]	KPS	—	Standard Oil Co. (New Jersey)	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Berlin WRB [76] [34]	WRB	100	Alaska Portland Packers' Association	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Beverly [128]	KND	50	Colonial Nav. Co.	300, **600**	P G	N	0.15	1.50
Biddle [125]	NVW	—	Navy	300, **600**	P G	N	0.20	2.00
Birmingham NCN [125]	NCN	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Blakely [125]	NVX	—	Navy	300, **600**	P G	N	0.20	2.00
Boston KXA [128]	KXA	50	New England S.S. Co.	300, 550, **600**	P G	N	0.15	1.50
Boston NGC [128]	NGC	—	Navy	300, **600**	P G	N	0.20	2.00
Boxer [125]	NSY	—	Navy	300, **600**	P G	N	0.20	2.00
Brabant [76]	KUU	200	The Texas Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Bradford [76]	KNG	200	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Bramell Point [76]	KRO	150	Vacuum Oil Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Brazos [76]	KEZ	200	Mallory S.S. Co.	300, 450, **600**	P G	N	0.20	2.00
Breakwater [76]	WBK	150	Southern Pacific Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Brilliant KTI [76]	KTI	200	Standard Transportation Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Brindilla [76]	KTZ	300	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Britannia KXS [76] [114]	KXS	100	Bay S.S. Co. of America	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Brooklyn [123]	NEA	[illegible]	[illegible]	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Brutus [125]	NNA	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Brynhilda [24] [76]	KIO	—	Brynhilda Shipping Corporation ..	300, 600	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Buccaneer KFO [76]	KFO	150	Freeport & Tampico Fuel Oil Transportation Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Buenaventura [76]	KWA	200	United States Steel Products Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Buffalo NCU [125]	NCU	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Buford [130] [129]	WXA	300	Army	600	P G	..	N	0.20	2.00
Bunker Hill [76]	KJB	200	Eastern S.S. Corporation	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Burnside [122] [129]	WXR	300	Army	600	O ..	..	—	—	—
Burrows [125]	NCV	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Bushnell [125]	NZC	—	Government	300, 600	P G	..	N	0.20	2.00
C. 1 [125]	NXK	—	Navy	300, 600	P G	..	N	0.20	2.00
C. 2 [125]	NXL	—	Navy	300, 600	P G	..	N	0.20	2.00
C. 3 [125]	NXM	—	Navy	300, 600	P G	..	N	0.20	2.00
C. 4 [125]	NXN	—	Navy	300, 600	P G	..	N	0.20	2.00
C. 5 [125]	NXO	—	Navy	300, 600	P G	..	N	0.20	2.00
Cabrillo [76] [123]	WBV	150	Wilmington Transportation Co.	300, 500, 600	P G	..	X	0.05	0.50
C. A. Canfield [76]	WIH	300	Petroleum Transport Co. ..	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cacique [131]	WBE	—	W. R. Grace & Co.	300, 600, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Caddo [76]	KSK	200	Standard Oil Co. (New Jersey) ..	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Caesar NCY [125]	NCY	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Calamares [123]	KLC	500	Calamares S.S. Corporation (United Fruit Co.)	300, 600	P G	..	N	0.40	4.00
California KYQ [4]	KYQ	200	Clara B. Stocker	300, 600	P G	..	N	0.20	2.00
California NDF [125]	NDF	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
California WOR [76]	WOR	150	Harby Steamship Co. (Inc.) ..	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Californian WKC [80]	WKC	200	American Hawaiian S.S. Co. ..	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Callao NQG [125]	NQG	—	Navy	300, 600	P G	..	N	0.20	2.00
Callao WHF [24] [80]	WHF	150	George W. McNear (Inc.) ..	300. 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Caloria [76]	KSP	200	Standard Oil Co. (New Jersey) ..	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Calvin Austin [76]	KRN	200	Eastern S.S. Corporation ..	300, 600	P G	..	N	0.20	2.00
Camaguey [76]	KWI	300	New York & Cuba Mail S.S. Co.	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Camden [76]	KRC	200	Eastern S.S. Corporation ..	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Campana [76]	KOM	200	Standard Oil Co. (New Jersey) ..	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cape Cod [76]	KPW	150	Captain F. H. Ely	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Captain A. F. Lucas [76] ..	WTV	150	Standard Oil Co., California ..	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Captain A. M. Wetherill [137] ..	WYT	35	Army	400	O ..	..	X	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Captain Barrett [137]	WYP	35	Army	400	O	X	—	—
Captain Chas. W. Rowell [137]	WYI	35	Army	400	O	X	—	—
Captain James Fornance [137]	WYM	35	Army	400	O	X	—	—
Captain T. M. Morrison [114 129]	WYZ	30	Army	1,200	O	X	—	—
Caracas [76]	KDB	200	Atlantic & Caribbean Steam Nav. Co.	300, **600**	P G	N	0.20	2.00
Carl D. Bradley [76 107]	WGN	—	Bradley Transportation Co.	300, **600**	P G	—	0.10	1.00
Carlos [80]	WNC	500	Olson & Mahony	300, 500, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Carolina KGB [76]	KGB	300	New York & Porto Rico S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Carolina WFE [76]	WFE	100	Goodrich Transit Co.	300, **600**	P G	X	0.10	1.00
Carolinian [76]	KJF	150	Export Leaf Tobacco Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Carrillo [113]	KDE	500	Carrillo S.S. Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Cartago [113]	KDD	500	Cartago Steamship Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Casiana [4]	KYE	—	Edward L. Doheny	—	—	—	—	—
Cassin [125]	NIK	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Castine [125]	NDA	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Catania WTI [76]	WTI	150	Huasteca Petroleum Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cauto [76]	KWF	—	New York and Cuba Mail S.S. Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Celilo [76]	WMF	150	C. R. McCormick & Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Celtic NDB [125]	NDB	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Centralia [76]	WSN	150	Centralia Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Chalmette [76]	KKC	300	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Charles E. Harwood [78]	WID	200	Petroleum Transport Co.	300, **600**	P G	X	0.20	2.00
Charles Pratt [76]	KSQ	300	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Charleston [125]	NFE	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Charlton Hall [76]	KLU	200	United States Steel Products Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Chattanooga [125]	NGI	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
[illegible] [125]	NIF	—	Navy	300, **600**	P G	N	0.20	2.00

Cherokee [76]	KVK	200	Clyde S.S. Co.	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Chester W. Chapin [128]	KXQ	50	New England S.S. Co.	300,550, 600	P G	..	N	0.15	1.50
Cheyenne NDH [125]	NDH	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Chicago NDI [125]	NDI	—	Naval Militia	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Chicago WAC [80]	WAC	100	Booth Fisheries Co.	300, 600	P G	..	X	0.20	2.00
China WWA [76]	WWA	150	China Mail Steamship Co.	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Choctaw [125]	NTV	—	Navy	300, 600	P G	..	N	0.20	2.00
Christopher Columbus [76]	WFJ	150	Goodrich Transit Co.	300, 600	P G	..	X	0.10	1.00
Cincinnati NDL [125]	NDL	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
City of Alpena II.[80]	WEH	125	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	..	X	0.10	1.00
City of Atlanta [76]	KFB	200	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
City of Augusta [76]	KFJ	300	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
City of Bangor [76]	KRH	200	Eastern S.S. Corporation	300, 600	P G	..	X	0.20	2.00
City of Benton Harbor [76]	WDV	150	Graham & Morton Transportation Co.	300, 600	P G	..	X	0.10	1.00
City of Buffalo [76]	WFQ	100	Cleveland & Buffalo Transit Co.	300, 600	P G	..	X	0.10	1.00
City of Cleveland III.[76]	WEA	125	Detroit & Cleveland Nav. Co.	300, 600	P G	..	N	0.10	1.00
City of Columbus [76]	KFA	200	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
City of Detroit II.[80]	WEC	125	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	..	N	0.10	1.00
City of Detroit III.[76]	WEF	125	Detroit & Cleveland Nav. Co.	300, 600	P G	..	N	0.10	1.00
City of Erie [76]	WFP	100	Cleveland & Buffalo Transit Co.	300, 600	P G	..	X	0.10	1.00
City of Everett [132]	KTQ	250	Standard Transportation Co.	300, 600	P G	..	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20	2.00
City of Grand Rapids [76]	WDS	125	Graham & Morton Transportation Co.	300, 600	P G	..	X	0.10	1.00
City of Lowell [128]	KXB	50	New England S.S. Co.	300, 550, 600	P G	..	N	0.15	1.50
City of Mackinnac II.[80]	WEB	125	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	..	X	0.10	1.00
City of Memphis [76]	**KFD**	**200**	**Ocean S.S. Co. (Savannah Line)**	**300, 600**	**P G**	..	**N**	**0.20** [101] **0.40** [102]	**2.00** [101] **4.00** [102]
City of Montgomery [76]	**KFY**	**300**	**Ocean S.S. Co. (Savannah Line)**	**300, 450, 600**	**P G**	..	**N**	**0.20** [101] **0.40** [102]	**2.00** [101] **4.00** [102]
City of Para [76]	**WWF**	**300**	**Pacific Mail S.S. Co.**	**300, 600**	**P G**	..	**N**	**0.20** [101] **0.40** [102]	**2.00** [101] **4.00** [102]
City of Puebla [76]	**WGQ**	**200**	**Pacific Coast Co.**	**300, 600**	**P G**	..	**N**	**0.20** [101] **0.40** [102]	**2.00** [101] **4.00** [102]
City of Rockland [76]	KRI	200	Eastern S.S. Corporation	300, 600	P G	..	X	0.20	2.00
City of St. Ignace [80]	WEG	125	Detroit & Cleveland Nav. Co.	300, 450, 500, 600	P G	..	X	0.10	1.00
City of St. Joseph [76]	WDT	125	Graham & Morton Transportation Co.	300, 600	P G	..	X	0.10	1.00
City of St. Louis [76]	KFX	300	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
City of Savannah [76]	KFK	200	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
City of Seattle [76]	WGA	100	Pacific Coast Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
City of South Haven [76]	WDI	150	Chicago & South Haven S.S. Co.	300, **600**	P G	X	0.10	1.00
City of Taunton [128]	KXL	50	New England S.S. Co.	300, 550, **600**	P G	N	0.15	1.50
City of Topeka [76]	WGY	200	Pacific Coast Co.	300. **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
City of Wilmington [76]	WQC	150	Alex. Sprunt & Son	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cleveland NDM [125]	NDM	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Coalinga [131]	WOT	150	Union S.S. Co.	300, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Coamo [76]	KGA	200	New York & Porto Rico S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Colombia [76]	WBH	—	Pacific Mail S.S. Co.	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Col. E. L. Drake [76]	WTS	150	Standard Oil Co., California	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Col. Geo. Armistead [116 129]	WYG	150	Army	600	O	X	—	—
Colon [80]	KMX	250	Panama Railroad Co.	300, 450, **600**	P G	N	0.20	2.00
Columbia NGA [125]	NGA	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Columbia WHC [76]	WHC	150	J. H. Wilson	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Columbine [126]	NLL	—	Department of Commerce (Bureau of Lighthouses)	**600**, 750, 1,000	O	X	—	—
Colusa WIN [76]	WIN	200	W. R. Grace & Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Comal [76]	KEM	200	Mallory S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Comanche KVC [76]	KVC	200	Clyde S.S. Co.	300, **600**	P G	N	0.20	2.00
Comanche NRW [127]	NRW	100	U.S. Revenue Cutter Service	300, **600**	P G	N	0.20	2.00
Comet KTJ [76]	KTJ	200	Standard Transportation Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Commodore [80]	WFZ	75	Illinois Naval Battalion	—	P	X	—	—
Commonwealth KXC [128]	KXC	50	New England S.S. Co.	300, 550, **600**	P G	N	0.15	1.50
Communipaw [76]	KOE	—	Standard Oil Co. (New Jersey)	300, **600**	—	—	—	—
Comus KKD [76]	KKD	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Concho [76]	KEC	300	Mallory S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [120]

Conneaut	WCU	100	Wyandotte Transportation Co.	300, **600**	P G	..	X	0.10	1.00
Connecticut [125]	NDQ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [121]
Constellation [125]	NEY	—	Navy	300, **600**	P G	..	N	0.20	2.00
Conyngham [125]	NJE	—	Navy	300, **600**	P G	..	N	0.20	2.00
Coppename [113]	KDF	500	Coppename S.S. Corporation (United Fruit Co.)	300, **600**	P G	..	N	0.40	4.00
Cordova WAR [80]	WAR	100	Alaska S.S. Co.	300, **600**	P G	..	X	0.20	2.00
Corning [76]	KIH	300	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Coronado [76]	WSO	100	Coronado Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Corsair [4] [76]	KYC	150	J. Pierpont Morgan estate	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Costa Rica [80]	WQI	500	Bristol Bay Packing Co.	300, **600**	P G	..	X	0.20	2.00
Craster Hall [76]	KLK	200	United States Steel Products Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Creole [76]	KKR	300	Southern Pacific Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cretan [76]	KQC	150	Merchants & Miners Transportation Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cristobal [80]	KMD	300	Panama Railroad Co.	300, 450, **600**	P G	..	N	0.20	2.00
Crofton Hall [76]	KLR	200	United States Steel Products Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Crook [137]	WXB	Day, 200; night, 900	Army	300, **600**	P G	..	N	0.20	2.00
Cubadist [76]	KNV	300	Cuba Distilling Co.	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Culgoa [125]	NDU	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Cumberland NSZ [125]	NSZ	—	Navy	300, **600**	P G	..	N	0.20	2.00
Cummings [125]	NIL	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Curacao [76]	WGK	150	Pacific Coast Co.	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Currier [76]	KNU	200	Cuba Distilling Co.	300, **600**	P G	..	X	0.20	2.00
Cushing NIM [125]	NIM	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Cushing KSC [76]	KSC	300	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Cuyama [125]	NOD	—	Navy	300, **600**	P G	..	N	0.20	2.00
Cyclops NDY [125]	NDY	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Cypress [126]	NLM	—	Department of Commerce (Bureau of Lighthouses)	**600**, 750, 1,000	O ..	..	X	—	—
Cyprus [4] [80]	KYD	200	Daniel C. Jackling	300, **600**	P ..	..	X	—	—
Cyrus W. Field [129]	WXS	130	Army	600	O ..	..	—	—	—
D.1. [125]	NXP	—	Navy	300, **600**	P G	..	N	0.20	2.00
D.2. [125]	NXQ	—	Navy	300, **600**	P G	..	N	0.20	2.00
D.3. [125]	NXR	—	Navy	300, **600**	P G	..	N	0.20	2.00
Dahlgren [125]	NVY	—	Navy	300, **600**	P G	..	N	0.20	2.00
Dakotan [76]	WKD	200	American-Hawaiian S.S. Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Dale [125]	NIG	—	Navy	300, **600**	P G	..	N	0.20	2.00
Dauntless [80] [114]	WRP[133]	100	Ship Owners & Merchants Tugboat Co.	300, **600**	P G	..	X	0.20	2.00
Davis [125]	NJF	—	Navy	300, **600**	P G	..	N	0.20	2.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
							Francs.	Francs.
UNITED STATES OF AMERICA—*contd.*								
Dawnlite [24 76]	KPP	—	Standard Oil Co. (New Jersey)	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Daylite [24 76]	KPR	—	Standard Oi lCo. (New Jersey)	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Dayton [76]	KNP	300	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Decatur [125]	NJC	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Defiance [80 114]	WRP[133]	100	Ship Owners & Merchants Tugboat Co.	300, **600**	P G	X	0.20	2.00
Delaware NEK [125]	NEK	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Delaware Sun [24 76]	KTW	250	Sun Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
De Long [125]	NWB	—	Navy	300, **600**	P G	N	0.20	2.00
Denver [125]	NEM	—	Navy	300. **600**	P G	—	0.20 [124]	2.00 [124]
Des Moines [125]	NEN	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
De Soto [76]	KNI	150	Standard Oil Co. (New Jersey)	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Despatch [76]	WOA	150	Border Line Transportation Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
D. G. Scofield [76]	WRD	150	Standard Oil Co., California	300, 450, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Diana KZM [4 76]	KZM	100	C. Ledyard Blair	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Dix [129 130]	WXC	300	Army	600	P G	N	0.20	2.00
Dixie [125]	NEP	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
D. N. Luckenbach [76]	KGW	—	Edgar F. Luckenbach	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Dochra [76]	KGL	300	Barber & Co., Inc.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Dolphin NEQ [125]	NEQ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Dolphin WAU [80]	WAU	100	Alaska S.S. Co.	300, **600**	P G	N	0.20	2.00
Don Juan de Austria [125]	NQI	—	Navy	300, **600**	P G	N	0.20	2.00
Dora [80]	WAH	100	Alaska S.S. Co.	300, **600**	P G	X	0.20	2.00
Dorchester [76]	KQD	200	Merchants & Miners Transportation Co.	300, **600**	P G	N	0.20	2.00
Dorothea [125]	NTS	—	Navy	300, **600**	P G	N	0.20	2.00
Dorothy Bradford [80]	KNA	100	Cape Cod S.S. Co.	300, **600**	— [104]	X	—	—
Downes [125]	NIN	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Drayton [125]	NET	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]

Eagle KIR [76]	KIR	—	Standard Transportation Co.	300, **600**	P G		0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Eagle NFC [125]	NFC	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Eastern States [76]	WEE	125	Detroit & Cleveland Nav. Co.	300, **600**	P G	N	0.10	1.00
Ecuador [76]	WBN	200	Pacific Mail S.S. Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Edgar F. Luckenbach [80]	KGK	250	Luckenbach Co. (Inc.)	300, 450, 530, **600**	P G	X	0.40	4.00
Edward L. Doheny [76]	WIE	150	Petroleum Transport Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Edward Luckenbach	KGQ	—	Luckenbach Co. (Inc.)	300, **600**	—	—	—	—
El Alba [76]	KKL	200	Southern Pacific Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Elcano [125]	NFD	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
El Capitan [76]	WNB	200	Standard Oil Co. (New Jersey)	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Cid [76]	KKT	200	Southern Pacific Co.	300, **600**	P G	X	0.20	2.00
El Dia [76]	KKY	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Elfrieda [125]	NEV	—	Navy	300, **600**	P G	N	0.20	2.00
Ellington	NLN	40	U.S. Department of Labor (Immigration Service)	300, **600**	O ..	10 a.m. to 10.30 p.m., 9 p.m. to 9.30 p.m.	—	—
El Mundo [76]	KKU	200	Southern Pacific Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Norte [76]	KKN	200	Southern Pacific Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Occidente [76]	KKX	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Oriente [76]	KKV	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Rio [76]	KKZ	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20	2.00
El Segundo [76]	WTQ	150	Standard Oil Co., California	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Siglo [76]	KKS	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Sol [76]	KKB	200	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Sud [76]	KKQ	200	Southern Pacific Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
El Valle [76]	KKW	200	Southern Pacific Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Enterprise [76]	WMN	200	Matson Nav. Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Eocene [80]	KTM	300	Standard Transportation Co.	300, **600**	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Ericsson [125]	NIS	—	Navy	300, **600**	P G	N	0.20	2.00
E. R. Sterling [24]	WIS	100	Sterling Shipping Co.	300, 450, **600**	P ..	X	—	—
Esperanza [76]	KWZ	200	New York & Cuba Mail S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Essex KQE [76]	KQE	200	Merchants & Miners Transportation Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Essex NMY [125]	NMY	—	Navy	300, **600**	P G	N	0.20	2.00
Eurana [76]	KJG	200	Southland S.S. Co.	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Eureka	WAE	—	Alaska Steam Ship Co.	300, **600**	—	—	—	—
Evangeline KII [76]	KII	200	A. W. Perry	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Excelsior KKO [76]	KKO	300	Southern Pacific Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Expansion [80 91]	WOH	20	North Alaska Salmon Co.	300, **600**	P G	X	0.20	2.00
Explorer [109 126]	NLI	150	Government	300, **600**	O ..	N	—	—
F.1.[125]	NXU	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
F.2.[125]	NXV	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
F.3.[125]	NXW	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
F. A. Kilburn [76]	WRW	150	North Pacific S.S. Co.	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Fanning [125]	NFM	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Farragut [125]	NVS	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Favorite [76]	WCF	100	Great Lakes Towing Co.	300, **600**	P G	X	0.10	1.00
Fearless WRP [80 114]	WRP [183]	100	Ship Owners & Merchants' Tugboat Co.	300, **600**	P G	X	0.20	2.00
Finland [76]	KSF	200	International Mercantile Marine Co. (Panama-Pacific Line)	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Fish Hawk [125]	NFV	—	Navy	300, **600**	P G	N	0.20	2.00
Florence Luckenbach [76]	WNM	200	Edgar F. Luckenbach	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Florida KUS [76]	KUS	150	The Texas Co.	300, **600**	P G	X	0.20	2.00
Florida NFR [125]	NFR	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Floridian [76]	WLR	300	American Hawaiian S.S. Co.	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Flusser [125]	NFS	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Foote [125]	NWF	—	Navy	300, **600**	P G	N	0.20	2.00
Fordonian [76]	KRU	—	American Star Line	300, **600**	P G	—	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Fort Bragg [80]	WLH	—	Charles H. Higgins & Co.	300, **600**	—	—	—	—
Fortune NVL [125]	NVL	—	Navy	300, **600**	P G	N	0.20	2.00
Fox NWJ [125]	NWJ	—	Navy	300, **600**	P G	N	0.20	2.00
F. Q. Barstow [76]	KNQ	—	Standard Oil Co. (New Jersey)	300, **600**	P G	—	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]

							0.40 [102]	4.00 [102]
Fred. W. Weller [76]	KNY	—	Standard Oil Co. (New Jersey)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Freeport Sulphur No. 1 [76]	KRA	100	Freeport Sulphur Transportation Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Fulton [125]	NZD	—	Navy	300, 600	P G	N	0.20	2.00
G.1.[125]	NXY	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
G.2.[125]	NXZ	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
G.3.[125]	NYA	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
G.4.[125]	NYB	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Galatea WGF [4 76 107]	WGF	100	E. L. Ford	300, 600	P G	X	0.10	1.00
Galveston [125]	NGD	—	Navy	300, 600	P G	N	0.20 [124]	2.00 [124]
Gargoyle [76]	KRK	200	Vacuum Oil Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
General A. M. Randol [137]	WYJ	35	Army	400	O	X	—	—
General E. O. C. Ord [137]	WYF	100	Army	400, 600	O	X	—	—
General Geo. H. Weeks [114 129]	WZT	—	Army	1,200	O	X	—	—
General G. W. Getty [114 129]	WYS	—	Army	1,200	O	X	—	—
General Harvey Brown [137]	WYK	35	Army	400	O	X	—	—
General Henry J. Hunt [137]	WYD	100	Army	600	O	X	—	—
General Henry Knox [137]	WYE	100	Army	600	O	X	—	—
General J. M. Brannan [114 129]	WZV	—	Army	1,200	O	X	—	—
General John M. Schofield [129]	WXW	—	Army	600	O	—	—	—
General Mifflin [129]	WZX	30	Army	400	O	X	—	—
General Nathaniel Greene [114 129]	WZR	—	Army	1,200	O	X	—	—
General Richard Arnold [114 129]	WYY	—	Army	1,200	O	X	—	—
General R. B. Ayres [137]	WYL	100	Army	600	O	X	—	—
General Robert Anderson [137]	WYH	35	Army	400	O	X	—	—
Genl. Robt. Swartout [114 129]	WYU	30	Army	400	O	X	—	—
Genl. R. H. Jackson [114 129]	WYW	30	Army	400	O	X	—	—
General R. N. Batchelder [114 129]	WZW	—	Army	1,200	O	X	—	—
General Royal T. Frank [137]	WYA	100	Army	600	O	X	—	—
Genl. S. B. Holabird [114 129]	WYV	30	Army	400	O	X	—	—
General S. N. Mills [137]	WYB	200	Army	600	O	X	—	—
General Timothy Pickering [114 129]	WZQ	—	Army	1,200	O	X	—	—
George E. Paddleford [76]	WIV	200	Pan American Petroleum & Transport Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
George W. Elder [76]	WRT	150	North Pacific S.S. Co.	300, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Georgia KUR [76]	KUR	200	The Texas Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Georgia NGF [125]	NGF	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Georgia WFA [76]	WFA	150	Goodrich Transit Co.	300, 600	P G	X	0.10	1.00
Gettysburg [76]	WCK	100	Moore & McCormack Co. Inc.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Glacier [125]	NGH	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Glenpool [76 91]	KOH	200	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Gloucester KQG [76]	KQG	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Gloucester NSL	NSL	—	Naval Militia	300, 600	—	—	—	—

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Goldsborough [125]	NGJ	—	Navy	300, **600**	P G ..	—	0.20 [124]	2.00 [124]
Gold Shell [76]	WIB	250	Gold Shell S.S. Co.	300, 450, **600**	P G ..	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Goliah [80]	WPG	100	Puget Sound Tug-Boat Co. ..	300, **600**	P G ..	X	0.20	2.00
Gopher [125]	NNY	—	Navy	300, **600**	P G ..	N	0.20	2.00
Governor [76]	WGR	200	Pacific Coast Co.	300, **600**	P G ..	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Governor Cobb [76]	KRB	200	Eastern S.S. Corporation ..	300, **600**	P G ..	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Governor Dingley [76]	KRV	200	Eastern S.S. Corporation ..	300, **600**	P G ..	N	0.20	2.00
Grace Dollar [76]	WSF	100	Grace Dollar S.S. Co.	300, **600**	P G ..	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Granite State [125]	NNZ	—	Navy	300, **600**	P G ..	N	0.20	2.00
Great Northern [76]	WIR	150	Great Northern Pacific S.S. Co. ..	300, 450, **600**	P G ..	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Grecian [76]	KQR	150	Merchants and Miners Transportation Co.	300, 450, **600**	P G ..	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Gresham [127]	NRG	300	U.S. Revenue Cutter Service ..	300, **600**, 750	P G ..	N	0.20	2.00
Guantanamo [76]	KWN	200	New York & Cuba Mail S.S. Co.	300, **600**	P G ..	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Guardian [80] [122]	WGZ	200	Central & South American Telegraph Co.	300, **600**	P G ..	X	0.20	2.00
Gulfcoast [76]	KUE	200	Gulf Refining Co.	300, **600**	P G ..	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Gulflight [76]	KUA	200	Gulf Refining Co.	300, **600**	P G ..	X	0.20	2.00
Gulfoil [76]	KTG	200	Gulf Refining Co.	300, **600**	P G ..	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Gulfstream [76]	KTB	250	Gulf Refining Co.	300, **600**	P G ..	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
H.1.[125]	NYC	—	Navy	300, **600**	P G ..	—	0.20 [124]	2.00 [124]
H.2.[125]	NYD	—	Navy	300, **600**	P G ..	—	0.20 [124]	2.00 [124]
H.3.[125]	NYE	—	Navy	300, **600**	P G ..	—	0.20 [124]	2.00 [124]
Halcyon KZL [4] [80]	KZL	—	Dutee W. Flint	300 450, **600**	P	X	0.20	2.00
Hamilton [76]	KOA	200	Old Dominion S.S. Co.	300, 450, **600**	P G ..	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Hancock [125]	NHI	—	Navy	300, **600**	P G ..	—	0.20 [124]	2.00 [124]
Hannibal NGU [125] ..	NGU	—	Navy	300, **600**	P G ..	—	0.20 [124]	2.00 [124]

[illegible]				300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Harsteele [114] [80]	KEW	100	Steele Towing & Wrecking Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hartford [125]	NGV	—	Navy	300, 600	P G	N	0.20	2.00
Harvard [131]	WRH	150	Metropolitan S.S. Co. (Pac. Stm. Nav. Co.)	300, 600, 1,800	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hattie Luckenbach [76]	WNF	200	Edgar F. Luckenbach	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Havana [76]	KWH	300	New York & Cuba Mail S.S. Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hawaiian [80]	WKU	200	American Hawaiian S.S. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hawk [125]	NSM	—	Navy	300, 600	P G	N	0.20	2.00
H. C. Folger [76]	KHS	—	Atlantic Refining Co.	300, 600	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Healdton [76]	KOF	300	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hector [125]	NGX	—	Navy	300 600	P G	—	0.20 [124]	2.00 [124]
Helena [125]	NGY	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Henley [125]	NHA	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Henry J. Biddle [80]	WOW	250	Columbia Contract Co.	300, 600	P G	X	0.20	2.00
Henry M. Flagler [76] [123]	KOX	100	Florida East Coast Railway Co.	300, 600	P G	X	0.20	2.00
Henry R. Mallory [76]	KEF	250	Mallory S.S. Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Henry T. Scott	WRA	150	California S.S. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Henry Wilson [114] [129]	WZS	—	Army	1,200	O ...	X	—	—
Herbert G. Wylie [76]	WIF	200	Petroleum Transport Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hercules NTW [125]	NTW	—	Navy	300, 600	P G	N	0.20	2.00
Hercules WRP [80] [114]	WRP[133]	100	Ship Owners & Merchants' Tugboat Co.	300, 600	P G	X	0.20	2.00
Heredia [113]	KDH	500	Heredia Steamship Corporation (United Fruit Co.)	300, 600	P G	N	0.40	4.00
Herman Frasch [132]	KFH	250	Union Sulphur Co.	300, 600	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20	2.00
Hermosa [76] [123]	WBP	150	Wilmington Transportation Co.	300, 500, 600	P R [103]	X	0.05	0.50
Hewitt [80]	KIL	250	Union Sulphur Co.	300, 600	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 7 p.m. to 9 p.m.	— [23]	— [23]
H. H. Rogers [76]	KSI	200	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Hilonian [76]	WMM	200	Matson Nav. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
H. M. Flagler [76]	KER	—	Standard Oil Co. (New Jersey)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Holland WDW [76]	WDW	150	Graham & Morton Transportation Co.	300, 600	P G	X	0.10	1.00
Hopkins [125]	NHC	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Howard [76]	KQH	200	Merchants & Miners Transportation Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Howick Hall [76]	KLT	200	United States Steel Products Co.	300, **600**	P G	X	0.20	2.00
Hull [125]	NHE	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Humboldt [76]	WHX	100	Humboldt S.S. Co.	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Huntington [125]	NWG	—	Navy	300, **600**	P G	N	0.20	2.00
Huntress [125]	NSN	—	Navy	300, **600**	P G	N	0.20	2.00
Huron KVH [76]	KVH	300	Clyde S.S. Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Huron WCH [75 107]	WCH	—	Wyandotte Transportation Co.	300, **600**	P G	—	0.10	1.00
Hyades [76]	WMK	200	Matson Nav. Co.	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Iaqua [76]	WLI	100	Parr, McCormick S.S. Co.	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Idaho WOO [76]	WOO	—	Wilson Bros. & Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Idaho NHN [125]	NHN	—	Navy	300, **600**	P G	N	0.20	2.00
I. D. Fletcher [76 119]	KFI	200	Coast Transit Co.	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Illinois KTH [76]	KTH	200	The Texas Co.	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Illinois NHO [125]	NHO	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Illinois WCZ [76]	WCZ	150	Northern Michigan Transportation Co.	300, **600**	P G	X	0.10	1.00
Inco No. 1 [76 119]	WQA	150	Inland Navigation Co.	300, 450, **600**	P G	X	0.20	2.00
Indiana NHQ [125]	NHQ	—	Navy	300, **600**	P G	—	0.20	2.00
Indiana WFC [105 76]	WFC	100	Goodrich Transit Co.	300, **600**	P G	X	0.10	1.00
Intrepid NFY [125]	NFY	—	Navy	300, **600**	P G	N	0.20	2.00
Iowa [125]	NHT	—	Navy	600	P G	—	0.20 [124]	2.00 [124]
Iowan [80]	WKJ	250	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Iris NHU [125]	NHU	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Iroquois KVF [76]	KVF	300	Clyde S.S. Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Iroquois NHV [125]	NHV	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Isla de Luzon [125]	NQJ	—	Navy	300, **600**	—	—	—	—
Isthmian [80]	WKI	200	American-Hawaiian S.S. Co.	300, **600**	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Itasca [illegible]	[illegible]	[illegible]						

				300, 600	P G	..	N	0.20	2.00
J. A. Bostwick [76]	KJN	—	Standard Oil Co. (New Jersey)	—	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
J. A. Chanslor [131]	WTK	200	Associated Oil Co.	300, **600**, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Jacob Jones [125]	NKG	—	Navy	300, **600**			—	—	—
James McGee [76]	KTP	—	Standard Oil Co. (New Jersey)	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Jamestown [76]	KOC	400	Old Dominion S.S. Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
J. A. Moffett [76]	WRE	150	Standard Oil Co., California	300, **600**, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Jarvis [125]	NIB	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Jason NNB [125]	NNB	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Jefferson KOD [76]	KOD	200	Old Dominion S.S. Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Jefferson WAJ [80]	WAJ	100	Alaska S.S. Co.	300, **600**	P G	..	N	0.20	2.00
Jenkins [125]	NID	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Jim Butler [76]	WIL	150	Olson & Mahony	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
J. L. Luckenbach [76]	KGT	200	Edgar F. Luckenbach	300, **600**	P G	..	N	0.20	2.00
J. M. Danziger [76]	WIW	250	Pan American Petroleum & Transport Co.	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
J. M. Guffey [76]	KTF	200	Gulf Refining Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
John D. Archbold [76]	KTK	200	Standard Oil Co. (New Jersey)	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
John D. Rockefeller [76]	KTO	300	Standard Oil Co. (New Jersey)	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Joseph Henry [129 122]	WXT	130	Army	600	O	..	—	-	—
Joseph Pulitzer [80]	WPZ	75	Port of Portland	300, 450, 525, **600**	P G	..	X	0.20	2.00
Joseph R. Parrott [76 123]	KJP	200	Florida East Coast Railway Co.	300, 450, **600**	P G	..	X	0.20	2.00
Josiah Macy [76]	KEX	—	Standard Oil Co. (New Jersey)	—	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Jouett [125]	NIE	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Juneau [80]	WAM	100	Alaska S.S. Co.	300 550, **600**	P G	..	X	0.20	2.00
Juniata KQJ [76]	KQJ	200	Merchants & Miners Transportation Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Juniata WCB [76]	WCB	150	Great Lakes Transit Corporation	300 **600**	P G	..	N	0.10	1.00
Jupiter NNC [125]	NNC	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Justin [125]	NNJ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
J. W. Van Dyke [76]	KHR	—	Atlantic Refining Co.	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
K. 1. [125]	NYF	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
K. 2. [125]	NYG	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
K. 3. [125]	NYH	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
K. 4. [125]	NYI	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
K. 5. [125]	NYJ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
K. 6. [125]	NYK	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
K. 7. [125]	NYL	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs
K.8. [125]	NYM	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Kanawha NND [125]	NND	—	Navy	300, **600**	P G	N	0.20	2.00
Kansan [80]	WKK	200	American-Hawaiian S.S. Co.	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kansas NIO [125]	NIO	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Karina KYR [4 80]	KYR	—	Theodore P. Burgess	—	—	—	—	—
Kearsarge [125]	NIP	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Kentra [76]	KLN	200	United States Steel Products Co.	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kentuckian [80]	WKE	200	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kentucky NIQ [125]	NIQ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Kershaw [76]	KQK	200	Merchants & Miners Transportation Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kilpatrick [129 130]	WXD	300	Army	600	P G	N	0.20	2.00
Klamath [76]	WSX	150	Klamath S.S. Co. (C. R. McCormick & Co.)	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kroonland [76]	KSH	200	International Mercantile Marine Co. (Panama Pacific Line).	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kukui [115 126]	NLF	100	Government	300, **600**	O	X	—	—
Kuskokwim River [76 91]	WLK	150	Westward Navigation Co. (Inc.)	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Kvichak [80]	WNS	300	Alaska Packers' Association	300, 400, 500, **600**	P G	N	0.20	2.00
L.1. [125]	NYN	—	Navy	300, **600**	P G	N	0.20	2.00
L.2. [125]	NYO	—	Navy	300, **600**	P G	N	0.20	2.00
L.3. [125]	NYP	—	Navy	300, **600**	P G	N	0.20	2.00
L.4. [125]	NYQ	—	Navy	300, **600**	P G	N	0.20	2.00
L.9. [125]	NYV	—	Navy	300, **600**	P G	N	0.20	2.00
L.10. [125]	NYW	—	Navy	300, **600**	P G	N	0.20	2.00
L.11. [125]	NYX	—	Navy	300, **600**	P G	N	0.20	2.00
La Brea [131]	WON	300	Union Oil Co. of California	300, **600**, 1,800	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Lackawanna KOP [76]	KOP	150	R. Lawrence Smith Inc.	300, 450, **600**	P G	—	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Lakeland [76]	WDL	125	Northwestern Steamship Co.	300, **600**	P G	N	0.10	1.00
Lakeport [76]	WDJ	100	Northwestern Steamship Co.	300, **600**	P G	X	0.10	1.00
Lakewood [76]	WDK	100	Northwestern Steamship Co.	300, **600**	P G	X	0.10	1.00
[illegible]				[illegible] **600**	[illegible]	N	0.20 [101]	2.00 [101]

[illegible] [125]	[illegible]		Navy	300, **600**	P G	N	0.20	2.00
Lansing [131]	WTC	150	Union S.S. Co.	300, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Larimer [76]	KTA	200	Gulf Refining Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Latouche [80]	WAI	100	Alaska S.S. Co.	300, **600**	P G	X	0.20	2.00
Lawrence [125]	NIY	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Lebanon [125]	NIZ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Lenape [76]	KVL	200	Clyde S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Leonidas NNH [125]	NNH	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Lewis Luckenbach [76]	WNH	—	Edgar F. Luckenbach	—	—	—	0.20	2.00
Lexington [110] [128]	KNB	50	Colonial Nav. Co.	300, 550, **600**	P G	N	0.15	1.50
Lieut. Geo. M. Harris [114] [129]	WYR	30	Army	400	O ..	X	—	—
Ligonier [76]	KTD	200	Gulf Refining Co.	300, **600**	P G	X	0.20	2.00
Liscum [129] [130]	WXE	300	Army	600	P G	N	0.20	2.00
Logan [129] [130]	WXF	300	Army	600	P G	N	0.20	2.00
Los Angeles [131]	WOL	200	Union Oil Co. of California	300, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Louisiana KUL [76]	KUL	300	The Texas Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Louisiana NJB [125]	NJB	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
L. Roscoe	NZX	150	Alaska Engineering Commission	300, **600**, 750	O ..	X	—	—
Luckenbach No. 1. [112] [114]	KEO	—	Edgar F. Luckenbach	—	—	—	—	—
Luckenbach No. 2 [112]	KGC	—	Edgar F. Luckenbach	—	—	—	—	—
Luckenbach No. 3 [112]	KGF	—	Edgar F. Luckenbach	—	—	—	—	—
Luckenbach No. 4	KGG	—	Edgar F. Luckenbach	—	—	—	—	—
Lurline [76]	WML	150	Matson Nav. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Lydonia [4] [76]	WDY	150	W. A. Lydon	300, **600**	P G	X	0.10	1.00
Lyman Stewart [131]	WTL	150	Union Oil Co. of California	300, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Lysistrata [4] [80]	KYL	—	James Gordon Bennett	300, **600**	P G	X	—	—
M.1. [125]	NYY	—	Navy	300, **600**	P G	N	0.20	2.00
Macdonagh [125]	NJH	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Machias [125]	NQL	—	Naval Militia	300, **600**	P G	—	0.20 [124]	2.00 [124]
Mackinaw [80]	WHW	500	George and James Flood	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Macona [76]	KFC	300	Barber & Co. (Inc.)	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Madison [76]	KOG	300	Old Dominion S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Maine KXD [128]	KXD	50	New England S.S. Co.	300, 450, 500, 550, **600**	P G	N	0.15	1.50
Maine NJL [125]	NJL	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Maitland No. 1 [76] [123]	WLE	100	Toronto, Hamilton & Buffalo Rly. Co.	300, **600**	P G	X	0.10	1.00
Major Albert G. Forse [114] [129]	WYQ	—	Army	1,200	O ..	X	—	—
Major Evan Thomas [114] [129]	WYO	35	Army	300	O ..	—	—	—
Major Guy Howard [129]	WZY	30	Army	400	O ..	X	—	—
Major Samuel Ringgold [116] [129]	WYC	35	Army	300	O ..	—	—	—
Manchuria [76]	WWE	250	Atlantic Transport Co. of West Virginia	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Manitou WFW [76]	WFW	150	Northern Michigan Transportation Co.	300, **600**	P G	N	0.10	1.00
Manning [127]	NRN	150	U.S. Revenue Cutter Service	300, **600**	P G	N	0.20	2.00
Manoa [76]	WMQ	200	Matson Nav. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Maracaibo [76]	KDM	300	Atlantic & Caribbean Steam Nav. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Marblehead	NGK	—	Naval Militia	300, **600**	—	—	—	—
Marietta [125]	NJQ	—	Naval Militia	300, **600**	P G	—	0.20 [124]	2.00 [124]
Marina [76]	KXU	—	Bull Insular Steamship Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Marina Quezada	KHP	—	Edwin C. Gregory	—	—	—	—	—
Mariposa [80]	WHP	200	Alaska S.S. Co.	300, 455, 525, **600**	P G	N	0.20	2.00
Marquette & Bessemer No. 1 [80] [123]	WEW	125	Marquette & Bessemer Dock & Nav. Co.	300, 425, 540, **600**	P R [106]	N	0.10	1.00
Marquette & Bessemer No. 2 [80] [123]	WEX	125	Marquette & Bessemer Dock & Nav. Co.	300, 425, 540, **600**	P R [93]	N	0.10	1.00
Mars NJR [125]	NJR	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Maryland KIN [76]	KIN	200	Crew Levick Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mascotte [76]	KOW	150	Peninsular & Occidental S.S Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Massachusetts KJM [76]	KJM	200	Eastern S.S. Corporation	300, **600**	P G	N	0.20	2.00
Massachusetts NJT [125]	NJT	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Massasoit NUB [125]	NUB	—	Navy	300, **600**	P G	N	0.20	2.00
Matinicock [76]	KID	200	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Matsonia [76]	WMP	150	Matson Nav. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Maui [76]	WMR	—	Matson Nav. Co.	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Maumee [125]	NNE	—	Navy	300, **600**	P G	N	0.20	2.00
May [4] [80]	KZI	—	J. R. De Lamar	—	—	—	0.20	2.00
Mayflower [4] [125]	NJV	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Mayrant [125]	NJU	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
McCall [125]	NJW	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
[illegible]	[illegible]	—	[illegible]	**600**	P G	N	0.20	2.00

[illegible] [125]	[illegible]	300	Army	600	P G	..	N	0.20	2.00
Medina KEI [76]	KEI	300	Mallory S.S. Co.	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Melville [125]	NKA	—	Government	300, **600**	P G	..	N	0.20	2.00
Merrimack [76]	KQM	200	Merchants & Miners Transportation Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Merritt [129] [130]	WXI	300	Army	600	P G	..	N	0.20	2.00
Metapan [113]	KLF	500	Metapan S.S. Corporation (United Fruit Co.)	300, **600**	P G	..	N	0.40	4.00
Mexican [80]	WKL	350	American Hawaiian S.S. Co. ..	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mexicano KGM [76]	KGM	200	Pierce Navigation Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mexico KWX [76]	KWX	200	New York & Cuba Mail S.S. Co...	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Miami KOZ [76]	KOZ	150	Peninsular & Occidental S.S. Co.	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Michigan NJZ [125]	NJZ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Mielero [76]	KNT	—	Cuba Distilling Co.	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Millinocket [76]	KNM	200	A. H. Bull S.S. Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Milwaukee NFB [125]	NFB	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Minneapolis NGB [125]	NGB	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Minnesota NKD [125]	NKD	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Minnesota WEK [76]	WEK	150	Northern Michigan Transportation Co.	300, **600**	P G	..	N	0.10	1.00
Minnesota WMI [76]	WMI	150	Great Northern S.S. Co.	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Minnesotan [76]	WKM	200	American Hawaiian S.S. Co. ..	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mississippi [125]	NKE	—	Navy	300, **600**	P G	..	N	0.20	2.00
Missouri NKF [125]	NKF	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Missouri WFX [76]	WFX	125	Northern Michigan Transportation Co.	300, **600**	P G	..	N	0.10	1.00
Missourian [80]	WKX	350	American Hawaiian S.S. Co. ..	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Modoc [125]	NUD	—	Navy	300, **600**	P G	..	N	0.20	2.00
Mohave [125]	NTO	—	Navy	300, **600**	P G	..	N	0.20	2.00
Mohawk KXE [128]	KXE	50	New England S.S. Co.	300, 550, **600**	P G	..	N	0.15	1.50
Mohawk KVM [76]	KVM	200	Clyde S.S. Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mohawk KYU [4] [80]	KYU	10	Ralph E. Barry	300	P ..	..	X	—	—
Mohawk NRM [127]	NRM	150	U.S. Revenue Cutter Service ..	300, **600**	P G	..	N	0.20	2.00
Mohawk NUE [125]	NUE	—	Navy	300, **600**	P G	..	N	0.20	2.00
Mohegan NZA [125]	NZA	—	Navy	300, **600**	P G	..	N	0.20	2.00
Mohegan KXM [110] [128] ..	KXM	50	New England S.S. Co.	300, 550, **600**	P G	..	N	0.15	1.50
Momus [76]	KKM	300	Southern Pacific Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Monadnock [125]	NHD	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Monaghan [125]	NKL	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Mongolia WWN	WWN	250	Atlantic Transport Co. of West Virginia	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Monocacy [125]	NQQ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Montana [125]	NKM	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Montanan [80]	WKN	200	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Monterey KWY [76]	KWY	200	New York & Cuba Mail S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Monterey NKN [125]	NKN	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Montgomery [125]	NKO	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Moonlite [24] [76]	KPL	100	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mooremack [76]	WCL	200	Moore & McCormack Co. (Inc.)	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Moreni [76]	KNX	200	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Morrill [127]	NRC	75	U.S. Revenue Cutter Service	**300**, 600	P G	N	0.20	2.00
Morris NWS [125]	NWS	—	Navy	300, **600**	P G	N	0.20	2.00
Morro Castle [76]	KWC	300	New York & Cuba Mail S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Motano [76]	KSB	200	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mount Hope [80]	KOL	—	Providence, Fall River & Newport Steamboat Co.	300	P G [104]	X	—	—
Multnomah [76]	WMA	150	Multnomah S.S. Co. (C. R. McCormick & Co.)	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Munamar [76]	KUI	200	Munson Steamship Line	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Mundale [76]	KUJ	200	Munson Steamship Line	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Munplace [76]	KUG	200	Munson Steamship Line	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Munsomo [76]	KUK	200	Munson Steamship Line	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Munwood [76]	KUH	200	Munson Steamship Line	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Muskogee [76]	KIB	300	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
N.1. [125]	NZE	—	Navy	300, **600**	P G	N	0.20	2.00
N.2. [125]	NZF	—	Navy	300, **600**	P G	N	0.20	2.00
N.3. [125]	NZG	—	Navy	300, **600**	P G	N	0.20	2.00
N.5. [illegible]	[illegible]	[illegible]	[illegible]	300, **600**	P G	N	0.20	2.00

N 6 [125]	[illegible]		Navy	300, 600	P G	..	N	0.20	2.00
Nacoochee [76]	KFP	300	Ocean S.S. Co. (Savannah Line)	300, 450, 600	P G	..	N	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Nanshan [125]	NNK	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Nantucket [76]	KQN	150	Merchants & Miners Transportation Co.	300, 450, 600	P G	..	N	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Narkeeta [125]	NUF	—	Navy	300, 600	P G	..	N	0.20	2.00
Nashville [125]	NKY	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Navahoe KOR [76]	KOR	200	R. Lawrence Smith (Inc.)	300, 450, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Navajo NKZ [125]	NKZ	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Navajo WNJ [76]	WNJ	300	Navajo S.S. Co.	300, 450, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Navesink [117] [129]	WXU	100	Army	400, 600, 800	O ..	..	—	—	—
Nebraska [125]	NMA	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Neches [76]	KEE	300	Mallory S.S. Co.	300, 450, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Nelson [76]	KNL	200	Cuba Distilling Co.	300, 450, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Neptune NMS [125]	NMS	—	Navy	300, 600	P R [72]	..	—	0.20 [124]	2.00 [124]
Nereus [125]	NNF	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Nero [125]	NMB	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Nevada NCA [125]	NCA	—	Navy	300, 600	P G	..	N	0.20	2.00
Nevada WFD [76]	WFD	100	Goodrich Transit Co.	300, 600	P G	..	X	0.10	1.00
New Hampshire KXF [128]	KXF	50	New England S.S. Co.	300, 550, 600	P G	..	N	0.15	1.50
New Hampshire NME [125]	NME	—	Navy	300, 600	P G	..	—	0.24 [124]	2.00 [124]
New Haven KXN [110] [128]	KXN	50	New England S.S. Co.	300, 550, 600	P G	..	N	0.15	1.50
New Jersey [125]	NMF	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
New Orleans [125]	NMG	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Newport NMH [125]	NMH	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Newport WWH [76]	WWH	150	Pacific Mail S.S. Co.	300, 600	P G	..	N	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
New York KSN [76]	KSN	200	American Line	300, 600	P G	..	N	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
New York KUW [76]	KUW	300	The Texas Co.	300, 450, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
New York NCC [125]	NCC	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Niagara KYN [4] [80]	KYN	200	Howard Gould	300, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Nicholson [125]	NIU	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Nirvana [4] [76]	KYK	—	Rodman Wanamaker	300, 600	P G	..	—	0.20	2.00
Nokomis [4] [76]	WCW	100	Horace E. Dodge	300, 600	P G	..	X	0.10	1.00
Noma [4] [76]	KYO	200	Vincent Astor	300, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Norlina [76]	KJE	150	Garland Steamship Corporation	300, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
Norman Bridge [76]	WIG	200	Petroleum Transport Co.	300, 600	P G	..	X	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]
North American [76]	WEN	150	Chicago, Duluth & Georgian Bay Transit Co.	300, 600	P G	..	N	0.10	1.00
North Carolina [125]	NMN	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
North Dakota [125]	NMO	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Northern Pacific [76]	WIM	150	Great Northern Pacific S.S. Co.	300, 465, 600	P G	..	N	0.20 [101]	2.00 [101]
								0.40 [102]	4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
North Land KJD [76]	KJD	200	Eastern S.S. Corporation	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
North Land WCN [76]	WCN	150	Northern S.S. Co.	300, **600**	P G	N	0.10	1.00
North Star [76]	KJS	200	Eastern S.S. Corporation	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Northwestern KUO [76]	KUO	200	The Texas Co.	300, **600**	P G	X	0.20	2.00
Northwestern WAN [80]	WAN	100	Alaska S.S. Co.	300, **600**	P G	N	0.20	2.00
North Wind [4 80]	KYB	75	Chas. M. Clark	300	P	X	—	—
Norwood [80]	WSG	250	Pacific-American Fisheries Co.	300, 450, 525, **600**	P G	X	0.20	2.00
Nueces [76]	KEH	200	Mallory S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Nushagak [80]	WNE	300	Alaska Packers' Association	300, 400, 500, **600**	P G	N	0.20	2.00
O. B. Jennings [76]	KEN	—	Standard Oil Co. (New Jersey)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
O'Brien NIV [125]	NIV	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Octorara [76]	WCD	150	Great Lakes Transit Corporation	300, **600**	P G	N	0.10	1.00
Ohio NMW [125]	NMW	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Ohioan [80]	WKQ	200	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Oklahoma [125]	NCB	—	Navy	300, **600**	P G	N	0.20	2.00
Oleum [131]	WTD	150	Union Oil Co. of California	300, **600**, 1,800	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Olivette [76]	KOV	200	Peninsular & Occidental S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Olympia NGG [125]	NGG	—	Navy	300, **600**	P G	N	0.20	2.00
Onega [76]	KGU	200	Barber & Co. (Inc.)	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Oneida KYP [4 80]	KYP	250	E. C. Benedict	300, 550, **600**	P	X	—	—
Oneida NSO [125]	NSO	—	Navy	300, **600**	P G	N	0.20	2.00
Oneonta [80 114]	WPX	100	Port of Portland	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Onondaga [127]	NRO	300	U.S. Revenue Cutter Service	300, **600**, 750	P G	N	0.20	2.00
Ontario NTA [125]	NTA	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Ontario KQO [76]	KQO	150	Merchants & Miners Transportation Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
[illegible] NMZ [125]	NMZ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]

Oregon WOC [76]	WOC	300	Wilson Bros. & Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Oregon WOU [76]	WOU	—	Crowley Launch & Tugboat Co.	—	—	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Oregonian [80]	WKO	200	American-Hawaiian S.S. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Orion NOC [125]	NOC	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Osceola [125]	NOA	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Ossipee [127]	NRJ	300	Government	300, 600, 750, 1,000	P G	N	0.20	2.00
O. T. Waring [76]	KJW	—	Standard Oil Co. (New Jersey)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Ozark [125]	NHH	—	Navy	300, 600	P G	—	— [124]	— [124]
Paducah [125]	NOG	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Palos [125]	NQS	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Pamlico [127]	NRR	50	U.S. Revenue Cutter Service	300. 600	P G	N	0.20	2.00
Pampanga [125]	NQT	—	Navy	300, 600	P G	—	0.20	2.00
Panama KMH [80]	KMH	300	Panama Railroad Co.	300, 450, 600	P G	N	0.20	2.00
Panaman [80]	WKR	200	American-Hawaiian S.S. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Pan-American [76]	KUT	150	The Texas Co.	300, 450. 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Panther NOJ [125]	NOJ	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Panuco KMM [76]	KMM	200	Freeport & Tampico Fuel Oil Corporation	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
anuco KWM [76]	KWM	—	New York & Cuba Mail S.S. Co.	300, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Paraguay [76]	KTT	150	Sun Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Paraiso [76]	WRI	200	Craig Shipbuilding Co.	300, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Parismina [113]	KDG	500	Parismina S.S. Corporation (United Fruit Co.)	300, 600	P G	N	0.40	4.00
Parker [125]	NIX	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Pastores [113]	KLA	500	Pastores S.S. Corporation (United Fruit Co.)	300, 600	P G	N	0.40	4.00
Patapsco [125]	NOL	—	Navy	600	P R [73]	—	0.20 [124]	2.00 [124]
Pathfinder [109] [126]	NLJ	150	Navy	300, 600	O	N	—	—
Patterson NLH [109] [126]	NLH	150	Navy	300, 600	O	N	—	—
Patterson NOK [125]	NOK	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Patrol WIP [80]	WIP	5	City of Seattle (Harbor Dept.)	300, 325	P	X	—	—
Patuxent [125]	NOM	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Paulding [125]	NON	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Paul Jones KVU [80] [114]	KVU	—	James W. Elwell & Co.	300, 600	P G	—	0.20	2.00
Paul Jones NOP [125]	NOP	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Paulsboro [76]	KRS	—	Vacuum Oil Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Pawnee NUH [125]	NUH	—	Navy	300, 600	P G	N	0.20	2.00
Pawtucket [125]	NUJ	—	Navy	300, 600	P G	N	0.20	2.00
Pearl Shell [76]	WIC	250	Pearl Shell S.S. Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Penacook [125]	NUK	—	Navy	300, 600	P G	N	0.20	2.00
Pennant [76] [91]	KME	200	Pierce Navigation Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call. Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type.)	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs
Pennyslvania NCE [125]	NCE	—	Navy	300, **600**	P G	N	0.20	2.00
Pennsylvania WWI [76]	WWI	200	Pacific Mail S.S. Co.	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Pennsylvanian [80]	WKP	200	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [103]	4.00 [102]
Pentucket [125]	NUL	—	Navy	300, **600**	P G	N	0.20	2.00
Peoria [125]	NOW	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Pequonnock [125]	KXP	50	New England S S. Co.	300, 550, **600**	P G	N	5	1.50
Pere Marquette [123 76]	WDA	100	Pere Marquette Railroad Co.	300, 500, **600**	P	X	—	—
Pere Marquette 17 [123 76]	WDC	100	Pere Marquette Railroad Co.	300, 500, **600**	P	X	—	—
Pere Marquette 18 [123 76]	WDD	125	Pere Marquette Railroad Co.	300, 500, **600**	P	X	—	—
Pere Marquette 19 [123 76]	WDB	125	Pere Marquette Railroad Co.	300, 500, **600**	P	X	0.10	1.00
Pere Marquette 20 [123 76]	WDE	125	Pere Marquette Railroad Co.	300, 500, **600**	P	X	0.10	1.00
Perfection [76]	KTN	200	Standard Transportation Co.	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Perkins [125]	NOX	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Perry [125]	NOY	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Persian [76]	KQX	200	Merchants & Miners Transportation Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Peru WWJ [76]	WWJ	150	Pacific Mail S.S. Co.	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Petoskey [76 107]	WDH	100	Chicago & South Haven S.S. Co.	300, **600**	P G	X	0.10	1.00
Petrel [125]	NOZ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Petrolite [76]	KIF	200	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Philadelphia KDA [76]	KDA	300	Atlantic & Caribbean Steam Nav. Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Philadelphia KSM [76]	KSM	200	American Line	300, **600**	P G	N	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Pioneer KIG [76]	KIG	200	Standard Oil Co. (New Jersey)	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Pioneer WPN [80 114]	WPN	100	Puget Sound Tug-Boat Co.	300, **600**	P G	X	0.20	2.00
Pittsburgh [125]	NOT	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Platuria [76]	KSE	200	Standard Oil Co. (New Jersey)	300, **600**	P G	X	0.20 [101]	2.00 [101]
Pleiades [76]	WNP	200	Edgar F. Luckenbach	300, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]
Plymouth [110 128]	KXH	50	New England S.S. Co.	300, 550, **600**	P G	N	0.15	1.50
Pocahontas [125]	NOU	—	Navy	300, **600**	P G	N	0.20	2.00
Polarine [76]	KOI	200	Standard Oil Co. (New Jersey)	300, 450, **600**	P G	X	0.20 [101]	2.00 [101]
							0.40 [102]	4.00 [102]

Pompey [125]	NQF	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Ponce [76]	KGP	200	New York & Porto Rico S.S. Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Porter [125]	NOO	—	Navy	300, 600	P G	N	0.20	2.00
Portland [80]	WNV	300	Nymo Line (Inc.)	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Potomac NQK [125]	NQK	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Powhatan NUP [125]	NUP	—	Navy	300, 600	P G	N	0.20	2.00
Prairie [125]	NQM	—	Navy	300, 600	P R [73]	—	0.20 [124]	2.00 [124]
Preble [125]	NQN	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
President [76]	WGP	200	Pacific Coast Co.	300, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Preston NQO [125]	NQO	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Princess Anne [76]	KOB	200	Old Dominion S.S. Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Princeton NQP [125]	NQP	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Princeton KST [76]	KST	200	Standard Oil Co. (New Jersey)	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Priscilla [128]	KXI	50	New England S.S. Co.	300, 550, 600	P G	N	0.15	1.50
Prometheus NQR [125]	NQR	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Proteus KKP [76]	KKP	300	Southern Pacific Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Proteus NNG [125]	NNG	—	Navy	300, 600	P G	—	0.20	2.00
Providence [110 128]	KXJ	50	New England S.S. Co.	300, 550, 600	P G	N	0.15	1.50
Providencia [108]	WIK	200	Olson & Mahony	300, 600	P G	X	0.10	1.00
Pueblo [125]	NDN	—	Navy	300, 600	P G	N	0.20	2.00
Puritan [76]	WDU	100	Graham & Morton Transportation Co.	300, 600	P G	X	0.10	1.00
Quantico [76]	KQQ	200	Merchants & Miners Transporta- Co.	300, 450, 600	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Queen WGX [76]	WGX	150	Pacific Coast S.S. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Quiros [125]	NQZ	—	Navy	300, 600	P G	N	0.20	2.00
Radiant [76]	KTR	200	Standard Transportation Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Rainbow NTD [125]	NTD	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Raleigh [125]	NTE	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Ranger NFU [125]	NFU	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Ransom B. Fuller [76]	KRF	200	Eastern S.S. Corporation	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Ravalli [76]	WGI	100	Pacific Coast S.S. Co.	300, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Rayo [132]	KTL	250	Standard Transportation Co.	300, 600	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20	2.00
Redondo [80]	WBM	100	Alaska S.S. Co.	300, 600	P G	X	0.20	2.00
Reid [125]	NTU	—	Navy	300, 600	P G	—	0.20 [124]	2.00 [124]
Relay [122 80]	KVZ	200	Mexican Telegraph Co.	300, 600	P ..	X	—	—
Relief KRJ [80]	KRJ	200	Merritt & Chapman Derrick and Wrecking Co.	300, 450, 600	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Relief NHK [125]	NHK	—	Navy	300, 600	P G	N	0.20	2.00
Relief Lightship 66 or 85 [125]	NLD	—	Government	300, 600	P G	—	0.20	2.00

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Relief Lightship 71 or 72 [125]	NLE	—	Government	300, **600**	P G	—	0.20	2.00
Relief Lightship 94 or 53 [125]	NLG	—	Government	300, **600**	P G	—	0.20	2.00
Remlik [4 80]	KZR	**200**	**Willis S. Kilmer**	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Reno [114 129]	WYN	35	**Army**	300	O ..	—	—	—
Republic [76]	WSU	150	Braden Copper Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Rescue [80]	KRP	100	Merritt & Chapman Derrick and Wrecking Co.	300, **600**	P G	X	0.40	4.00
Resolute [80 114]	KRM	200	Merritt & Chapman Derrick and Wrecking Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Restorer WIU [122 76]	WIU	100	Commercial Pacific Cable Co.	250, 300, **600**	P ..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Reuce [24 80]	WSR	100	Columbia River Packers' Assn.	300, 525, **600**	P G	X	0.20	2.00
Rhode Island [125]	NTX	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Richard Peck [128]	KXR	50	New England S.S. Co.	300, 450, 500, 550, **600**	P G	N	0.15	1.50
Richmond [76]	WTR	200	Standard Oil Co., California	300, **600**	P G	X	0.20	2.00
Rio Grande KEG [76]	KEG	200	Mallory S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Roamer [4 80]	KZN	100	State of Florida (Shellfish Commission)	300, 450, **600**	P G	X	0.20	2.00
Rochester [76]	KDY	200	Vacuum Oil Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Rocket [125]	NUT	—	Navy	300, **600**	P G	N	0.20	2.00
Rockingham [76]	WKY	200	Garland Steamship Corporation	300, 450, **600**	P G	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Rodgers [125]	NWT	—	Navy	300, **600**	P G	N	0.20	2.00
Roe [125]	NTZ	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Roosevelt [126]	NLR	300	Department of Commerce, Bureau of Fisheries	300, **600**	O ..	X	—	—
Rose City [76]	WWR	200	San Francisco & Portland S.S. Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Rowan [125]	NKR	—	Navy	300, **600**	P G	N	0.20	2.00
Royal Arrow [76]	KSW	300	Standard Transportation Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sabine [76]	KEB	300	Mallory S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sacramento [125]	NQV	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]

								0.20	2.00
St. Louis KSL [76]	KSL	200	American Line	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
St. Louis NTF [125]	NTF	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
St. Nicholas [24 80]	WSS	100	Columbia River Packers' Association	300, 525, 600	P G	..	X	0.20	2.00
St. Paul [76]	KSO	200	American Line	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Salem [125]	NTP	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Samoset [125]	NUU	—	Navy	300, 600	P G	..	N	0.20	2.00
Sampson [125]	NKS	—	Navy	300, 600	P G	..	N	0.20	2.00
Samson WOS [80 114]	WOS	100	Columbia Contract Co.	300, 600	P G	..	X	0.20	2.00
Samuel Mitchell [76 107] ..	WEJ	—	Huron Transportation Co. ..	300, 600	P G	..	—	0.10	1.00
San Diego [125]	NCZ	—	Navy	300, 600	P G	..	N	0.20	2.00
San Francisco KRT [76] ..	KRT	200	United States Steel Products Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
San Francisco NTQ [125] ..	NTQ	—	Navy	300, 600	P G	..	N	0.20	2.00
San Jacinto [76]	KES	200	Mallory S.S. Co.	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
San Jose [76]	WWL	200	Pacific Mail S.S. Co.	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
San Juan KGJ [76]	KGJ	300	New York & Porto Rico S.S. Co.	300, 450, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
San Juan WWM [76]	WWM	200	Pacific Mail S.S. Co.	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
San Marcos [76]	KEK	200	Mallory S.S. Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
San Mateo [113]	KLV	300	San Mateo S.S. Corporation (United Fruit Co.)	300, 600	P G	..	X	0.40	4.00
San Pedro [129]	WZZ	30	Army	400	O ..	..	X	—	—
San Ramon [76]	WNW	150	San Ramon S.S. Co. of Wilmington (Delaware)	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Alicia [76]	WSJ	150	W. R. Grace & Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Ana [80]	WAL	100	Alaska S.S. Co.	300, 600	P G	..	N	0.20	2.00
Santa Barbara [76]	WBJ	200	Atlantic & Pacific S.S. Co. (W. R. Grace & Co.)	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Catalina [76]	WBC	200	Atlantic and Pacific S.S. Co. (W. R. Grace & Co.)	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Cecilia [76]	WBB	200	Atlantic and Pacific S.S. Co. (W. R. Grace & Co.)	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Clara [76]	WBA	200	Atlantic & Pacific S.S. Co. (W. R. Grace & Co.)	300, 600	P G	..	X	0.20	2.00
Santa Cruz WBD [76]	WBD	200	Atlantic & Pacific S.S. Co. (W. R. Grace & Co.)	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Maria WTF [131] ..	WTF	150	United S.S. Co.	300, 600, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Marta [113]	KLG	500	Santa Marta S.S. Corporation (United Fruit Co.)	300, 600	P G	..	N	0.40	4.00
Santanta [4 80]	KZS	30	Osborne Howes	300, 600	P ..	..	X	—	—
Santa Rita WBR [80]	WBR	500	W. R. Grace & Co.	300, 525, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santa Rita WTG [76]	WTG	100	Sun Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITFD STATES OF AMERICA—*contd.*							Francs.	Francs.
Santa Rosalia [76]	KLO	200	United States Steel Products Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Santiago [76]	KWE	300	New York & Cuba Mail S.S. Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Saramacca [113]	KLH	350	Saramacca S.S. Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Saratoga KWS [76]	KWS	300	New York & Cuba Mail S.S. Co.	300, 450, **600**	P G	N	0.20 [101]	2.00 [101]
Saratoga NTR [125]	NTR	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Satsuma KJI [76]	KJI	200	Barber & Co. (Inc.)	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Saturn [125]	NNM	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Sayonara [4 80]	KYJ	200	A. J. Drexel	300, **600**	—	—	—	—
Schley [125]	NKT	—	Navy	300, **600**	P G	N	0.20	2.00
Scorpion NTT [125]	NTT	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Seafarer	WPL	—	Seafarer Navigation & Salvage Co.	—	—	—	—	—
Sea Rover [80]	WRP [183]	100	Ship Owners & Merchants' Tug-boat Co.	300, **600**	P G	X	0.20	2.00
Seattle NWE [125]	NWE	—	Navy	300, **600**	P G	N	0.20	2.00
Sebago [125]	NUV	—	Navy	300, **600**	P G	N	0.20	2.00
Security [76]	KSJ	200	Standard Transportation Co.	300. **600**	P G	X	0.20	2.00
Seeandbee [76]	WFS	150	Cleveland & Buffalo Transit Co.	300, **600**	P G	X	0.10	1.00
Seguranca [76]	KWG	200	Seguranca S. S. Corporation	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Seminole [127]	NRS	150	U.S. Revenue Cutter Service	300, **600**	P G	N	0.20	2.00
Senator [76]	WGS	100	Pacific Coast Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Senator Bailey [76 114]	KGS	200	Gulf Refining Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Seneca [127]	NRE	300	U.S. Revenue Cutter Service	300, **600**, 750	P G	N	0.20	2.00
Severn [125]	NZB	—	Navy	300, **600**	P G	N	0.20	2.00
Seward [80]	WAV	100	Seward Navigation Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Shaw [125]	NKU	—	Navy	300, **600**	P G	N	0.20	2.00
Shenango [76 119]	KTC	150	Gulf Refining Co.	300, **600**	P G	X	0.20	2.00
Sheridan [129 130]	WXJ	300	Army	600	P G	N	0.20	2.00
Sherman [129 130]	WXK	300	Army	600	P G	N	0.20	2.00
Shubrick [125]	NWU	—	Navy	300, **600**	P G	N	0.20	2.00
Sialin [80]	WFY	—	Estate of J. K. Stewart	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Sierra [131]	WHI	150	Oceanic S.S. Co. ..	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sioux NUW	NUW	—	Navy	300, **600**	P G	..	N	0.20	2.00
Sixaola [113]	KDS	500	Sixaola S.S. Corporation (United Fruit Co.)	300, **600**	P G	..	N	0.40	4.00
S. M. Fischer [85 114]	WPH	200	Reid Wrecking Co.	300, **600**	P G	..	X	0.10	1.00
Smith [125]	NSQ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Snohomish [127]	NRF	75	U.S. Revenue Cutter Service ..	**300**, 600	P G	..	N	0.20	2.00
S. O. Co. No. 91 [76 119]	WTU	100	Standard Oil Co., California ..	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
S. O. Co. No. 93 [76 119]	WTY	100	Standard Oil Co., California ..	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
S. O. Co. No. 95 [76 119]	WTZ	100	Standard Oil Co., California ..	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Socony [132]	KTX	250	Standard Transportation Co. ..	300, **600**	P G	..	9 a.m. to midday, 2 p.m. to 5 p.m., 8 p.m. to 10.30 p.m.	0.20	2.00
Solace [125]	NST	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Somers [125]	NWV	—	Navy	300, **600**	P G	..	N	0.20	2.00
Somerset KQS [76]	KQS	200	Merchants & Miners' Transportation Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Somerset KSU [76]	KSU	200	Standard Oil Co. (New Jersey) ..	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sonoma NTG [125]	NTG	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Sonoma WHM [131]	WHM	250	Oceanic S.S. Co.	300, **600**, 1,800	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sotoyomo [125]	NUX	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
South American [76]	WEO	125	Chicago, Duluth & Georgian Bay Transit Co.	300, **600**	P G	..	N	0.10	1.00
South Carolina [125]	NSW	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
South Dakota [125]	NSX	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Southery [125]	NJY	—	Navy	300, **600**	P G	..	N	0.20	2.00
Spokane [76]	WGE	100	Pacific Coast Co.	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sprigg Carroll [114 129]	WZU	—	Army	1,200	O ..	..	X	—	—
Standard Arrow [76]	KSV	250	Standard Transportation Co. ..	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Standard II. [76 114]	KSA	200	Standard Transportation Co. ..	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Standard KIC [76]	KIC	200	Standard Oil Co. (New Jersey) ..	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Standish [125]	NUY	—	Navy	300, **600**	P G	..	N	0.20	2.00
Starlite [24 76]	KPK	200	Standard Oil Co. (New Jersey) ..	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Starr [80]	WPS	100	San Juan Fishing and Packing Co.	300, **600**	P G	..	X	0.20	2.00
State of Ohio [76]	WFR	100	Cleveland & Buffalo Transit Co...	300, **600**	P G	..	X	0.10	1.00
Sterling NNL [125]	NNL	—	Navy	300, **600**	P G	..	N	0.20	2.00
Sterrett [125]	NTB	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Stewart [125]	NTC	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Stranger	NSR	—	Naval Militia	300, **600**	—	..	—	—	—
Sucrosa [76]	KNS	300	Cuba Distilling Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-length in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Sumner [129] [130]	WXL	300	Army	600	P G	N	0.20	2.00
Sun [76]	KTU	250	Sun Co.	300, **600**	P G	8 a.m. to midday	0.20	2.00
Sunlite [24] [76]	KPQ	200	Standard Oil Co. (New Jersey)	300, 450. **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sunoil [76]	KWP	200	Sun Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Supply [125]	NTK	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Suriname [113]	KLI	350	Suriname S.S. Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Suruga [76]	KGD	300	Barber & Co. (Inc.)	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Surveyor [125]	NQU	—	Navy	300, **600**	P G	N	0.20	2.00
Suwannee [76]	KQZ	150	Merchants & Miners' Transportation Co.	300, 450, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
S. V. Harkness [76]	KEU	—	Standard Oil Co. (New Jersey)	—	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Sylph [125]	NTL	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Sylvia NSS [125]	NSS	—	Navy	300, **600**	P G	N	0.20	2.00
Tacoma [125]	NUA	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Tallahassee [125]	NUC	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Tallapoosa [127]	NRV	300	Government	300, **600**, 750, 1,000	P G	N	0.20	2.00
Tamesi [76]	WTE	200	Freeport & Tampico Fuel Oil Corporation	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Tampa [127]	NRQ	300	U.S. Revenue Cutter Service	300, **600**, 750, 1,000	P G	N	0.20	2.00
Tasco [112] [80]	KFT	50	T. A. Scott Co.	300, **600**	P G	X	0.15	1.50
Tatoosh [80] [114]	WPE	100	Puget Sound Tug-Boat Co.	300, **600**	P G	X	0.20	2.00
Tecumesh [125]	NUZ	—	Navy	300, **600**	P G	N	0.20	2.00
Tenadores [113]	KLB	500	Tenadores S.S. Corporation (United Fruit Co.)	300, **600**	P G	N	0.40	4.00
Terry [125]	NUI	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Texan [80]	WKT	250	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Texas KUM [76]	KUM	300	The Texas Co.	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Texas NCD [125]	NCD	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
[illegible]	[illegible]	[illegible]	Wisconsin Steel Co.	300, **600**	P G	X	0.10	1.00

[illegible]			[illegible]	300, 600	P G	..	X	0.10	1.00
Thetis NRT [127]	NRT	150	U.S. Revenue Cutter Service	300, 600	P G	..	N	0.20	2.00
Thomas [129 130]	WXM	300	Army	600	P G	..	N	0.20	2.00
Thornton [125]	NWX	—	Navy	300, 600	P G	..	N	0.20	2.00
Tiger KIT [76]	KIT	—	Standard Transportation Co.	300, 600	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Tillamook [125]	NWW	—	Navy	300, 600	P G	..	N	0.20	2.00
Tingey [125]	NWY	—	Navy	300, 600	P G	..	N	0.20	2.00
Tionesta [76]	WCA	150	Great Lakes Transit Corporation	300, 600	P G	..	N	0.10	1.00
Tivives [113]	KMI	500	Tivives Steamship Corporation (United Fruit Co.)	300, 600	P G	..	N	0.40	4.00
Toledo [76]	KTV	200	Sun Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Tonopah [125]	NUN	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Topila [76]	KKE	200	Southern Pacific Co.	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Tormenter [76]	KFN	100	Freeport & Tampico Fuel Oil Corporation	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Traffic [125]	NVA	—	Navy	300, 600	P G	..	N	0.20	2.00
Transfer [125]	NVB	—	Navy	300, 600	P G	..	N	0.20	2.00
Trinidadian [76]	KNO	200	Gulf Refining Co.	300, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Trippe [125]	NUQ	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Triton NVC [125]	NVC	—	Navy	300, 600	P G	..	N	0.20	2.00
Truxton [125]	NUS	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Tucker [125]	NKV	—	Navy	300, 600	P G	..	N	0.20	2.00
Turrialba [113]	KDT	500	Turrialba S.S. Corporation (United Fruit Co.)	300, 600	P G	..	N	—	—
Tuscarora [127]	NRL	100	U.S. Revenue Cutter Service	300, 600	P G	..	N	0.20	2.00
Twilite [24 76]	KPO	—	Standard Oil Co. (New Jersey)	300, 600	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Tyee [80 114]	WPC	100	Puget Sound Tug-Boat Co.	300, 600	P G	..	X	0.20	2.00
Ulysses KPU [80]	KPU	300	Panama Railroad Co.	300, 600	P G	..	N	0.20 [101]	2.00 [101]
Umatilla [76]	WGU	200	Pacific Coast Co.	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Unadilla [125]	NVD	—	Navy	300, 600	P G	..	N	0.20	2.00
Unalga [127]	NRX	300	U.S. Revenue Cutter Service	300, 600, 800	P G	..	N	0.20	2.00
Uncas NVF [125]	NVF	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Utah [125]	NVE	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Vacuum [76]	KDX	250	Vacuum Oil Co.	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Valdez [80]	WAK	100	Alaska S.S. Co.	300, 600	P G	..	X	0.20	2.00
Vanadis [4 80]	KYT	300	Morton F. Plant	300, 600	P ..	..	X	—	—
Velero [4 80]	WHV	50	G. Allan Hancock	300	P G	..	X	0.20	2.00
Venetia [4 80]	WOV	100	J. D. Spreckels	300, 600	P ..	..	X	—	—
Venezuela WBG [76]	WBG	200	Pacific Mail S.S. Co.	300, 600	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Ventura [131]	WHL	150	Oceanic S.S. Co.	300, 600, 1,800	P G	..	N	0.40	4.00
Vermont [125]	NVK	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]
Vesta KTS [76]	KTS	200	Standard Transportation Co.	300, 450, 600	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Vestal [125]	NMC	—	Navy	300, 600	P G	..	—	0.20	2.00
Vesuvius [125]	NVM	—	Navy	300, 600	P G	..	—	0.20 [124]	2.00 [124]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-lengths in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Vicksburg [125]	NVN	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Victoria WAD [80]	WAD	100	Alaska S.S. Co.	300, **600**	P G	N	0.20	2.00
Vigilancia [76]	KWV	200	Gaston, Williams & Wigmore (Inc.)	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Vigo KMC [76]	KMC	—	Transoceanic S.S. Corporation	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Villalobos [125]	NVP	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Virginia KFR [76]	KFR	200	Gaston, Williams & Wigmore S.S. Corporation	300, 450, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Virginia NVR [125]	NVR	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Virginia WFH [76]	WFH	150	Goodrich Transit Co.	300, **600**	P G	X	0.10	1.00
Virginian WKV [80]	WKV	350	American-Hawaiian S.S. Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Vixen NSU [125]	NSU	—	Navy	300, **600**	P G	N	0.20	2.00
Vulcan NVT [125]	NVT	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Waban [125]	NVH	—	Navy	300, **600**	P G	N	0.20	2.00
Wadsworth [125]	NKW	—	Navy	300, **600**	P G	N	0.20	2.00
Walneta [125]	NVI	—	Navy	300, **600**	P G	N	0.20	2.00
Wainwright [125]	NKX	—	Navy	300, **600**	P G	N	0.20	2.00
Wakiva [4 76]	KYI	150	H. S. Harkness	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Walke [125]	NWL	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Wallula [80 114]	WPY	100	Port of Portland	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wanda [125]	NWZ	—	Navy	300, **600**	P G	N	0.20	2.00
Wapama [76]	WMG	100	Charles R. McCormick & Co.	300, **600**	P G	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Warren [129 130]	WXN	300	Army	000	P G	N	0.20	2.00
Warrington [125]	NWD	—	Navy	300, **600**	P G	—	0.20 [124]	2.00 [124]
Warrior KYW [4 80]	KYW	300	Alexander S. Cochran	300, **600**	P ..	X	—	—
Wasp	NSV	—	Naval Militia	300, **600**	P G	—	—	—
W. B. Keene [114 76]	KWK	200	Hilton-Dodge Lumber Co.	300, **600**	P G	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
W. C. Teagle [76]	KTY	—	Standard Oil Co. (New Jersey)	300, **600**	P G	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]

Wellington KMR [76, 114]	KMR	—	Cook-Cummer Steam Ship Co.	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Western States [80]	WED	125	Detroit & Cleveland Nav. Co.	300, 440, 500, **600**	P G	..	N	0.10	1.00
Westoil [76]	KJT	—	Standard Oil Co. (New Jersey)	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Westwego [76]	KGE	200	Union Petroleum S.S. Co.	300, 450, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
W. F. White [76, 107]	WGC	—	Limestone Transportation Co.	300, **600**	P G	..	—	0.10	1.00
Wheeling [125]	NWH	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Whipple [125]	NWI	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Whittier [131]	WHT	150	Union Transportation Co.	300, **600**, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
W. H. Tilford [76]	KPD	—	Standard Oil Co. (New Jersey)	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wico [76]	KNN	200	Standard Oil Co. (New Jersey)	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wild Duck [4, 76]	KYG	150	Gulf Refining Co.	300, **600**	P G	..	X	0.20	2.00
Wilhelmina [76]	WMO	250	Matson Nav. Co.	300, 450, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wilkes [125]	NKQ	—	Navy	300, **600**	P G	..	N	0.20	2.00
Willamette [76]	WSW	150	Willamette S.S. Co. (C. R. McCormick & Co.)	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
William O'Brien [76]	KPN	200	East Coast Transportation Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wilmington [125]	NWK	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Wilmore [76]	KIK	200	Berwind-White Coal Co. (Wilmore S.S. Co.)	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Windber [76]	WND	100	Pacific-American Fisheries	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Winifred [76]	KTE	200	Gulf Refining Co.	300, **600**	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Winslow [125]	NJA	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Wisconsin [125]	NWM	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Wm. F. Herrin [131]	WTN	150	Associated Oil Co.	300, **600**, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wm. G. Warden [76]	KNF	—	Standard Oil Co. (New Jersey)	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wm Rockefeller	KWO	—	Standard Oil Co. (New Jersey)	300, **600**	P G	..	—	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wolverine NGW [125]	NGW	—	Navy	300, **600**	P G	..	N	0.20	2.00
Wompatuck [125]	NVJ	—	Navy	300, **600**	P G	..	N	0.20	2.00
Worden [125]	NWP	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
W. S. Porter	WTM	150	Associated Oil Co.	300, **600**, 1,800	P G	..	X	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Wyandotte [76, 107]	WCO	—	Wyandotte Transportation Co.	300, **600**	P G	..	—	0.10	1.00
Wyoming [125]	NWQ	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Yale [131]	WRY	150	Metropolitan S.S. Co. (Pac. Steam Nav. Co.)	300, **600**	P G	..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Yamacraw [127]	NRY	150	U.S. Revenue Cutter Service	300, **600**	P G	..	N	0.20	2.00
Yankton [125]	NSK	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]
Yantic [125]	NHX	—	Navy	300. **600**	P G	..	N	0.20	2.00
Yorktown [125]	NQX	—	Navy	300, **600**	P G	..	—	0.20 [124]	2.00 [124]

Ship Stations—*Continued*

Name.	Call Signal.	Normal Range in Nautical Miles.	Shipping Line or Ship Owner.	Wave-lengths in Metres (the Normal Wave-lengths in Heavy Type).	Nature of Services Performed.	Hours of Service.	Ship Charge. Per Word.	Ship Charge. Minimum Charge.
UNITED STATES OF AMERICA—*contd.*							Francs.	Francs.
Yosemite [76]	WQY	150	Yosemite S.S. Co. (C. R. McCormick & Co.)	300, **600**	P G ..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Yucatan [76]	WMY	100	North Pacific S.S. Co.	300, **600**	P G ..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
Zacapa [113]	KLE	500	Zacapa S.S. Corporation (United Fruit Co.)	300, **600**	P G ..	N	0.40	4.00
Zapora [80]	WPQ	100	International Fisheries Co. ..	300, **600**	P G ..	X	0.20	2.00
Zealandia KNR [128]	KNR	200	Universal Transportation Co. ..	300, **600**	P G ..	X	0.20	2.00
Zulia [76]	KDZ	200	Atlantic and Caribbean Steam Nav. Co.	300, 450, **600**	P G ..	N	0.20 [101] 0.40 [102]	2.00 [101] 4.00 [102]
URUGUAY								
Avellaneda [136]	LMK	135	Compañia Argentina de Nav. (Nicolas Mihanovich) Ltd.	300, **600**	P G ..	N	0.40	4.00
Baron de Rio Branco ..	CWG	55	Navy	450, **600**	O	—	—	—
18 de Julio	CWF	55	Navy	450, **600**	O	—	—	—
Helios LLT [80]	LLT	135	Compañia Argentina de Nav. (Nicolas Mihanovich), Ltd.	300, **600**	P G ..	N	0.40	4.00
Ingeniero	CWH	55	Navy	600	O	—	—	—
Labrador [80]	LLU	80	Compañia Argentina de Nav. (Nicolas Mihanovich), Ltd.	300, **600**	P G ..	N	0.40	4.00
Montevideo CWE	CWE	220	Navy	450, **600**	O	—	—	—
Oyarvide	CWI	55	Hydrographic Service	450, **600**	O	—	—	—
Paris LLZ [80]	LLZ	135	Compañia Argentina de Nav. (Nicolas Mihanovich), Ltd.	300, **600**	P G ..	N	0.40	4.00
Rawson [136]	LML	135	Compañia Argentina de Nav. (Nicolas Mihanovich), Ltd.	300, **600**	P G ..	N	0.40	4.00
Triton LMB [80]	LMB	135	Compañia Argentina de Nav. (Nicolas Mihanovich), Ltd.	300, **600**	P G ..	N	0.40	4.00
Uruguay CWD..	CWD	220	Navy	450, **600**	O	—	—	—

NOTES

Ship Stations

1. The station is operated and controlled by the Government; it belongs to the Imperial Inspectorate of the radiotelegraph service, Trieste.

2. During the voyage between Trieste and North America, or vice versâ.

3. During the voyage between Trieste and South America, or vice versâ.

4. Yacht.

5. Fast day service between Trieste and Venice.

6. Trieste-Alexandria Line.

7. Trieste-India, Eastern Asia Line.

8. Trieste-North and South America Line.

9. Trieste-Bombay Line.

10. Operated and controlled by the Department of Customs, Ottawa.

11. Operated and controlled by the Société Anonyme Internationale de Télégraphie sans fil, Brussels.

12. Belgian Government steamer on the service between Ostend and Dover. The station is operated and controlled by the Belgian Government.

13. Correspondence restricted to Nieuport, North Foreland, and the steamers of the same line.

14. During the crossings, which take place three times a day in each direction. Time of crossing, about three hours. Departures: from Ostend at about 10.45 a.m., 3.30 p.m., and 11 p.m.; from Dover at about 11 a.m., 4.30 p.m., and 11 p.m.

15. In the case of radiotelegrams exchanged either between the steamers and Nieuport or between two steamers, no special ship charge. The total wireless charge is fixed at fr. 1.50 per radiotelegram of ten words or less, with fr. 0.10 additional for each word over ten. For correspondence with North Foreland, the ship charge is fr. 0.10 per word, with a minimum of fr. 1.00 per radiotelegram.

16. Operated and controlled by the Department of the Naval Service, Ottawa.

17. Operated and controlled by the Marconi Wireless Telegraph Company of Canada, Ltd., Montreal.

18. Operated and controlled by the Department of Marine, Ottawa.

19. Operated and controlled by the Department of Railways and Canals, Ottawa.

20. Lighthouse inspection ship. The station is operated and controlled by the Ministry of Marine.

21. Buoy inspection ship. The station is operated and controlled by the Ministry of Marine.

22. Public correspondence may be admitted, without ship charge, if there is no naval correspondence. Private radiotelegrams must be drawn up in plain language.

23. No ship charge.

24. Sailing vessel.

25. Operated and controlled by the Compagnie Française Maritime et Coloniale de Télégraphie sans Fil, Paris.

26. Ship engaged in a regular service between France on the one hand, and Corsica, Algeria, and Tunis on the other.

27. Engaged in a regular service between France and Corsica.

28. Ship engaged in a regular service between France and Algeria.

29. Ship engaged in a regular service between France, Algeria, and Tunis.

30. Ship engaged in a regular service between Calais and Dover.

31. Operated and controlled by the Deutsche Betriebsgeselischaft für drahtlose Telegraphie, Berlin.

32. In the case of radiotelegrams exchanged with British coast stations, the coast charge is fr. 0.30 per word with a minimum of fr. 1.80 per radiotelegram. In the case of radiotelegrams intended for the United Kingdom, a charge of fr. 0.35 per word, with a minimum of fr. 2.10 per radiotelegram, is made for the coast charge and the charge for transmission over the telegraph lines.

33. For radiotelegrams liable to charge.

34. Official correspondence with Sassnitz and Trälleborg, and also with the other ferry-boats of the Sassnitz-Trälleborg line, concerning the railway traffic.

35. Public correspondence with Sassnitz and Trälleborg, and also with the other ferry-boats of the Sassnitz-Trälleborg line.

36. Ferry-boat. The service of the Sassnitz-Trälleborg line being performed alternately by German and Swedish ferry-boats, it is necessary to replace the name of the ship station in the address of radiotelegrams by one of the following indications :—

Ferry-boat A for the boat leaving Sassnitz in the morning;
Ferry-boat C for the boat leaving Sassnitz in the afternoon;
Ferry-boat B for the boat leaving Trälleborg in the morning;
Ferry-boat D for the boat leaving Trälleborg in the afternoon.

37. The ship charge for radiotelegrams intended for the ferry-boats is, without regard to the nationality of the boats, fr. 0.18 per word, with a minimum of fr. 1.80, when the radiotelegrams are transmitted via Sassnitz; and fr. 0.14 per word, with a minimum of fr. 1.40, when they are transmitted via Trälleborg.

38. Special correspondence, relating to the service of the ship.

39. During the time of the voyage between New York and the West Indies.

40. Monday, 7 a.m. to 1 p.m.; Tuesday, noon to 8.30 p.m.; Wednesday, 2 p.m. to 6 p.m.; Thursday, noon to 8.30 p.m.; Friday, 7 p.m. to 10 p.m.; Saturday, noon to 8.30 p.m.; Sunday, 7 a.m. to 1 p.m., 2 p.m. to 8.30 p.m.

41. Operated and controlled by the Société Française Radio-électrique, Paris.

42. 6 a.m. to midnight, continuous service; midnight to 6 a.m., only during the first ten minutes of each hour.

43. Operated and controlled by the owner; the accounts are settled by the Deutsche Betriebsgesellschaft für drahtlose Telegraphie, Berlin.

44. Operated and controlled by the Marconi International Marine Communication Company, London.

45. The wave-length ordinarily employed is 450 metres.

46. The wave-length ordinarily employed is 400 metres.

47. Correspondence limited to Caister-on-Sea, North Foreland, and Scheveningen Port.

48. Communicates only with Seaforth (Liverpool).

49. The ship charge is reduced to fr. 0.15 per word with a minimum of fr. 0.90 per radiotelegram when the ship is engaged on voyages between the United Kingdom and ports less than 1,000 nautical miles (1,855 km.) distant from the United Kingdom.

50. In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is fr. 0.15 per word with a minimum of fr. 1.50 per radiotelegram. In the case of radiotelegrams exchanged with French coast stations, the coast charge is fr. 0.15 per word without a minimum.

51. Operated and controlled by Turnbull, Martin and Company, London.

52. Operated and controlled by the Marconi Wireless Telegraph Company of Canada, Montreal, for and on behalf of the Marconi International Marine Communication Company, Ltd., London.

53. Operated and controlled by the officers on board.

54. Operated and controlled by the Marconi Wireless Telegraph Company of America, New York, on behalf of the Marconi International Marine Communication Company, London.

55. The ship charge is reduced to fr. 0.10 per word with a minimum of fr. 1.00 when the ship travels between Victoria, Vancouver, and Seattle.

56. Steamer performing the day service between Flushing and Queenborough; from Flushing 11 a.m., from Queenborough 11.30 a.m.

57. Steamer performing the night service between Flushing and Folkestone; from Flushing midnight, from Folkestone 10.30 p.m

58. Additional wave of 500 metres for communication with Scheveningen Port.

59. Public correspondence restricted to radiotelegrams exchanged by the steamers of the Zeeland Company, between themselves and with the Scheveningen Port and North Foreland coast stations.

60. Public correspondence restricted to radiotelegrams exchanged by this steamer either with the Scheveningen Port and North Foreland coast stations, or with the other steamers of the Batavier-Line. When, however, on special occasions the ship departs from the normal route the station conducts general public correspondence.

61. Public correspondence may be admitted, without ship charge, if there is no official correspondence.

62. In the case of radiotelegrams transmitted through Scheveningen Port or exchanged with the other stations of the Zeeland Company, the total radiotelegraph charge is fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram. In the case of radiotelegrams exchanged through North Foreland, the ship charge is fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram, and the coast charge is fr. 0.15 per word with a minimum of fr. 1.50 per radiotelegram. For radiotelegrams intended for the United Kingdom, however, a charge is made (in addition to the ship charge), of fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram, representing the coast charge of North Foreland, and the inland wire charge.

63. In the case of radiotelegrams transmitted through North Foreland, the coast charge is fr. 0.15 per word with a minimum of fr. 1.50 per radiotelegram. For radiotelegrams intended for the United Kingdom, however, a charge is made (in addition to the ship charge), of fr. 0.20 per word with a minimum of fr. 2.00 per radiotelegram, representing the coast charge of North Foreland and the inland wire charge.

64. General particulars of the stations on all torpedo-boats of the Royal Navy; when necessary the number of the torpedo-boat is added.

65. General particulars of the stations on all submarines of the Royal Navy; when necessary the number of the submarine is added.

66. Operated and controlled by Compagnia Internazionale Marconi per le Comunicazioni Marittime, Rome.

67. Public correspondence with Constantza-Tunnel only.

68. Operated by the owner (or owners) of the vessel; controlled by the Société Anonyme Internationale de Telegraphie sans fil.

69. The ship charge is reduced to fr. 0.13 per word for correspondence with Russian coast and ship stations.

70. Also, in case of urgency, at any time of the day or night.

71. The station is open during the first and last fifteen minutes of each hour from 8 a.m. to 10 p.m.

72. 3 a.m. to 4 a.m., 6 a.m. to 7 a.m., 9 a.m. to 10 a.m., 11 a.m. to noon, 6 p.m. to 7 p.m., 8 p.m. to 9 p.m., 10 p.m. to midnight.

73. Public correspondence restricted to messages of the officers and crew. Ships proceeding singly may relay urgent messages to the coast on request. In both cases the ship charge will apply.

74. In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is fr. 0.30 per word with a minimum of fr. 1.80 per radiotelegram.

75. Operated and controlled by the owner (or owners) of the vessel; the accounts are settled through Siemens Bros. and Company, Woolwich, London, S.E.

76. Operated and controlled by the Marconi Wireless Telegraph Company of America, New York.

77. Exploration steamer: the station is operated and controlled by the Deutscher Seefischerei-Verein, Berlin.

78. The station is open only during the season of navigation (March and April).

79. Operated and controlled by the Marconi International Marine Communication Company, Ltd., London, for and on behalf of the Amalgamated Wireless (Australasia), Ltd., Sydney.

80. Operated and controlled by the owner (or owners) of the vessel.

81. Operated and controlled by the Amalgamated Wireless (Australasia), Ltd., Sydney.

82. During the time that the ship is in the Antarctic regions the station will also use such other wave-lengths as may be found to be necessary.

83. Operated and controlled by the Rio de Janeiro Agency of Marconi's Wireless Telegraph Company, Ltd., on behalf of the Marconi International Marine Communication Company, Ltd.

84. Operated and controlled by the Post Office Department, Ottawa.

85. Operated and controlled by the Marconi Wireless Telegraph Company, of Canada, Montreal, on behalf of the Marconi Wireless Telegraph Company of America, New York.

86. Operated by the Radio Electric Company of Canada, Ltd., Montreal.

87. Operated and controlled by the Compagnie Générale de Radiotélégraphie, Paris.

88. Ship engaged in a regular service between Dieppe and Newhaven.

89. In the case of radiotelegrams exchanged with coast stations of the United Kingdom, the coast charge is fr. 0.15 per word, with a minimum of fr. 1.50 per radiotelegram.

90. Operated and controlled by Siemens Bros. and Co., Ltd., Woolwich, London, S.E.

91. Motor-vessel.

92. Accounts are settled through Siemens Bros. and Co., Ltd., Woolwich, London, S.E.

93. The station communicates only with the vessel Marquette and Bessemer No. 1 and the Conneaut Harbor Coast Station.

94. Operated and controlled by the Federal Steam Navigation Company.

95. Steam tug plying between Nieuwediep or Ymuiden and the sea.

96. Operated and controlled by the Government.

97. Pilot-boat.

98. Operated and controlled by the Ministry of Communications.

99. Correspondence restricted to radiotelegrams exchanged with Chosen lighthouses and Japanese warships.

100. Operated and controlled by the Marconi Wireless Telegraph Company of America, for and on behalf of the Société Anonyme Internationale de Télégraphie sans Fil.

101. When the ship is trading in the North and South American service.

102. When the ship is trading in the transoceanic service.

103. The station communicates only with the ship station "Cabrillo" and with the coast stations Avalon (California) and East San Pedro (California).

104. Apparatus used in case of emergency only.

105. Engaged in passenger service on the Great Lakes.

106. The station communicates only with the vessel Marquette and Bessemer No 2 and the Conneaut Harbor coast station.

107. Navigates the Great Lakes.

108. Operated by the Golden Gate Transportation Company.

109. Surveying ship—Coast and Geodetic Survey.

110. Navigates Long Island Sound.

111. Public correspondence is admitted on the service of the crew.

112. Vessel used for wrecking operations.

113. Operated and controlled by the Tropical Radio Telegraph Company.

114. Tug.

115. Tender engaged in transporting supplies for fixed lightships of the Hawaiian Islands.

116. Mine-planter.

117. Dredge (Engineer Corps).

118. Surveying and exploring ship.

119. Barge.

120. For warships, see AUSTRIA-HUNGARY.

121. For vessels other than warships, see AUSTRIA and HUNGARY respectively.

122. Cable-ship.

123. Ferry-boat.

124. No charge is made for relaying messages.

125. Operated and controlled by the United States Naval Communication Service, Radio, Virginia.

126. Operated and controlled by the United States Department of Commerce.

127. Operated by the United States Coast Guard, Treasury Department, Washington, D.C.

128. Operated by the National Electric Signaling Company.

129. Operated by the United States Signal Corps, War Department, Washington, D.C.

130. Transport.

131. Operated by the Federal Telegraph Company.

132. Operated by the Atlantic Communication Company.

133. This call signal is interchangeable among the following tugs : Dauntless, Defiance, Fearless, Hercules, Sea Rover.

134. During the voyages between Gjedser and Warnemünde.

135. Accounts should be rendered to Pierre Mali, 25, Madison Square, New York (U.S.A.).

136. Operated and controlled by the Marconi Wireless Telegraph Company of America, New York, for and on behalf of the Compañia Marconi de Telegrafía Sin Hilos del Rio de La Plata, Buenos Aires.

137. Operated and controlled by the United States War Department.

CALL LETTERS

THE BUREAU INTERNATIONAL DE L'UNION TELEGRAPHIQUE OF BERNE allots to the various nations who are parties to the International Radiotelegraphic Convention combinations of "call" letters which are in turn allotted to ship and land stations. Below we give a list of the letters, and combinations of letters, and the countries to which these have been assigned.

A	All to Germany and Protectorates.
B	All to Great Britain.
CAA to CEZ	Chile.
CFA to CMZ	Not yet assigned.
CNA to CNZ	Morocco.
COA to COZ	Not yet assigned.
CPA to CPZ	Bolivia.
CQA to CQZ	Monaco.
CRA to CUZ	Portugal and Colonies.
CVA to CVZ	Roumania.
CWA to CWZ	Uruguay.
CXA to CZZ	Not yet assigned.
D	All to Germany and Protectorates.
EAA to EHZ	Spain and Colonies.
EIA to EZZ	Great Britain.
F	All to France and Colonies.
G	All to Great Britain.
HAA to HFZ	Austria-Hungary.
HGA to HHZ	Siam.
HIA to HIZ	Dominican Republic.
HJA to HKZ	Colombia (Republic).
HLA to HNU	Not yet assigned.
HNV to HNZ	New Hebrides.
HOA to HZZ	France and Colonies.
I	All to Italy and Colonies.
J	All to Japan and Possessions.
KAA to KCZ	Germany and Protectorates.
KDA to KZZ	U.S. of America.
LAA to LHZ	Norway.
LIA to LRZ	Argentine Republic.
LSA to LUZ	Not yet assigned.
LVA to LVZ	Guatemala.
LWA to LWZ	Not yet assigned.
LXA to LZZ	Bulgaria.
M	All to Great Britain.
N	All to U.S. of America
OAA to OBZ	Peru.
OCA to OFZ	Not yet assigned.
OGA to OMZ	Austria-Hungary.
ONA to OTZ	Belgium and Colonies.
OUA to OZZ	Denmark.
PAA to PIZ	Holland.
PJA to PJM	Curaçao (Dutch).
PJN to PJZ	Surinam (Dutch).
PKA to PMZ	Dutch East Indies.
PNA to PZZ	Brazil.
Q	Reserved for code abbreviations.
R	All to Russia.
SAA to SMZ	Sweden.
SNA to STZ	Brazil.
SUA to SUZ	Egypt.
SVA to SZZ	Greece.
TAA to TMZ	Turkey.
TNA to TZZ	Germany and Protectorates.
UAA to UMZ	France and Colonies.
UNA to UNZ	Bosnia-Herzegovina.
UOA to UZZ	Austria-Hungary.
VAA to VGZ	Canada.
VHA to VKZ	Commonwealth of Australia.
VLA to VMZ	New Zealand.
VNA to VNZ	Union of South Africa.
VOA to VOZ	Newfoundland.
VPA to VSZ	British Colonies not autonomous.
VTA to VWZ	British India.
VXA to VXZ	New Zealand.
VYA to VZZ	British Colonies and Protectorates.
W	All to United States of America.
XAA to XDZ	Mexico.
XEA to XMZ	Not yet assigned.
XNA to XSZ	China.
XTA to XZZ	Not yet assigned.
Y	All to Great Britain.
Z	All to Great Britain.

CALL LETTERS

(Alphabetically arranged)

ALLOTTED TO LAND AND SHIP STATIONS.

(*c.s.* = cable-ship; *f.b.* = ferry-boat; *g.v.* = government vessel; *b.* = barge; *l.s.* = land-station; *m.v.* = motor vessel; *s.s.* = steam-ship; *s.t.* = tug; *s.v.* = sailing vessel; *s.y.* = steam yacht.)

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THE FLEMING VALVE AND DE FOREST AUDION

UNITED STATES' PATENT DECISION

BY far the most important and at the same time interesting wireless patent action of the year 1916 was that of The Marconi Wireless Telegraph Company of America against De Forest Radio Telephone and Telegraph Company and Lee de Forest, before Judge Mayer and the United States District Court. The suit was for infringement of Claims 1 and 37 of U.S. Letters Patent No. 803,684, for "Instrument for Converting Electric Currents into Continuous Currents," filed April 19th, 1905, and issued November 7th, 1905, to plaintiff as assignee of John Ambrose Fleming, of London, England.

There was a counterclaim by defendants on various claims of ten patents of Lee de Forest.

At the opening of the trial, plaintiff confessed judgment as to Claims 4 and 6 of U.S. Letters Patent No. 841,387, and defendants withdrew from issue Claim 5 of the same patent. Plaintiff also confessed judgment as to the claims in issue of U.S. Letters Patent. No. 879,532 and defendants withdrew U.S. Letters Patent No. 837,901. Of the counterclaim there remained in issue certain claims of seven patents as follows :—

No.	Claims.	Filed.	Issued.
979,275	8, 16, 20, 29 & 35	Feb. 2, 1905	Dec. 20, 1910
867,876	3, 4, 5, 6, 7, 14, 18	Orig. Feb. 2, 1905 Div. Apl. 4, 1906	Oct. 8, 1907
867,877	4	Orig. Feb. 2, 1905 Div. June 12, 1907	Oct. 8, 1907
867,878	2	Orig. Feb. 2, 1905 Div. June 12, 1907	Oct. 8, 1907
824,637	8	Jan. 18, 1906	June 26, 1906
836,070	5, 6, 7, 8	Orig. Jan. 18, 1906 Div. May 19, 1906	Nov. 13, 1906
841,386	1, 2, 3, 13, 15, 20, 21	Aug. 27, 1906	Jan. 15, 1907

In delivering his opinion after the case had been thoroughly threshed out and important witnesses called by both sides, Judge Mayer said that :

"Whatever differences may exist between men of science in respect of the theories by which they account for the movement and action of the unseen forces about which so much has been testified and argued in this case, the solution of the points of the controversy with a single exception is not difficult. This, because courts, in an art of this kind, place their decisions upon things demonstrable and cannot speculate as to theories in regard to which there is not a common agreement among recognised authorities.

"In endeavouring to resist plaintiff's attack, defendants have proceeded on the theory that beginning with his parent patent No. 979,275 antedating Fleming, De Forest gradually developed his

first conception until finally it found practical exemplification in the two so-called three electrode 'Audion' devices as to which plaintiff has confessed judgment. In line with this plan of defence, defendants have elaborately built up an unsteady theoretical structure and upon this have superimposed an observatory from which they can see in the mind's eye only that which they call 'Audion' action. Therefore, in these circumstances, it is desirable, in order to avoid confusion, to consider first the patents in issue and then the question of infringement; for when their true value is assigned to the patents, the controversy as to infringement will be better understood. The patents deal with those instrumentalities which, in the art, are aptly named detectors."

The learned judge then dealt with detectors in general, and traced the history of these important parts of a wireless installation. Incidentally it may be mentioned that this portion of the opinion forms a valuable and lucid treatise on detectors of all forms. Having spoken of the various types in use up to the time of Dr. Fleming's invention of the vacuum valve detector, Judge Mayer said:

"With the state of the art as briefly outlined, *supra*, John Ambrose Fleming disclosed the incandescent lamp detector. While the United States patent application was filed April 19th, 1905, the effective date is that of the British Specification filed November 16th, 1904.

"Fleming is a British scientist of the highest standing and, as appears from his patent and his papers read before learned societies, is and long has been recognised, as a man of major accomplishments with the ability to make clear what he intends to convey.

"Stripped of technical phraseology, what Fleming did was to take the well-known Edison hot and cold electrode incandescent electric lamp and use it for a detector of radio signals.

"No one had disclosed nor even intimated the possibility of this use of a device then long known in another art. Cohering filings, magnets, electrolytes and sensitive crystals, at that time, failed to give any hint of the utility in this art of the Edison lamp.

"What led Fleming to his result was his adherence to the theory of the 'rectified' alternating currents. In his patent specification he puts his proposition thus: 'This invention relates to certain new and useful devices for converting alternating electric currents and especially high-frequency alternating electric currents or electric oscillations into continuous electric currents for the purpose of making them detectable by and measurable with ordinary direct-current instruments, such as a "mirror-galvanometer" of the usual type or any ordinary direct-current ammeter. Such instruments as the latter are not affected by alternating electric currents either of high or low frequency, which can only be measured and detected by instruments called "alternating-current" instruments of special design. It is, however, of great practical importance to be able to detect feeble electric oscillations, such as are employed in Hertzian-wave telegraphy by an ordinary movable coil or movable needle mirror-galvanometer. This can be done if the alternating current can be "rectified"—that is, either suppressing all the constituent electric currents in one direction and preserving the others or else by changing the direction of one of the sets of currents which compose the alternating current so that the whole movement of electricity is in one direction.'

. . . .

" ' I have discovered that if two conductors are enclosed in a vessel in which a good vacuum is made, one being heated to a high temperature, the space between the hot and cold conductors possesses a unilateral electric conductivity, and negative electricity can pass from the hot conductor to the cold conductor, but not in the reverse direction. As the hot conductor should be heated to a very high temperature, say, near to the melting point of platinum (1,700° centigrade), it should be of carbon, preferably in the form of a filament such as is used in any ordinary incandescent electric lamp. The cold conductor may be of many materials, but I prefer a bright metal, such as platinum or aluminium or else carbon. The two conductors are enclosed in a glass bulb similar to that of an incandescent lamp, and I generally heat the carbon filament to a high state of incandescence by a continuous electric current, the electrical connection to the filament and the cold conductor being made by platinum wires, sealed air-tight through the glass.'

" He clearly described the necessity for a high degree of vacuum and a highly incandescent filament. (Fleming patent, p. 1, line 96; p. 2, line 5). In his lecture before the Royal Society read February 9th. 1905 (' Proceedings of the Royal Society,' Vol. 74, particularly pp. 477, 481–485; also see Waterman's Test, p. 1083 *et seq.*), he described the mode of operation of his device, making equally clear what he had set forth in his patent specification and, further, illustrated his views by a sheet of ' characteristic curves.' The ' characteristic curve ' is a curve plotted between voltage applied to the detector and the current through the detector resulting from the application of this voltage. It is obtained by connecting a circuit containing a battery and a galvanometer or ammeter and a resistance whereby the potential of the battery may be varied to the hot and cold elements of the detector. Connected across the detector is a voltmeter to measure the applied local battery voltage. I agree with plaintiff that this sheet disclosed to one skilled in the art everything necessary to obtain a complete knowledge of the operation of the device. It showed that as the incandescence of the filament increases this detector device becomes more sensitive and logically, therefore, the device should be operated at a high degree of incandescence, obtainable by whatever were known means therefor. Why the device thus operates successfully to detect signals is not as yet surely understood, but that it does so operate is an unescapable fact.

" Fleming called the operation ' rectification,' and held that, substantially speaking, the current will flow through the lamp in one direction only—*i.e.*, from the cold cylinder to the hot filament. In his 1905 lecture he said:

" ' Perfect rectifying power, however, does not exist. There is not an infinite resistance to movement of negative electricity from the metal cylinder to the hot filament through the vacuum, although this resistance is immensely greater than that which opposes the movement of negative electricity in the opposite direction.'

. . . .

" ' Returning, then, to the vacuum valve, we may note that the curves in Fg. 3 show that the vacuum space possesses a maximum conductivity corresponding to a potential difference of about 20 volts between the electrodes, for the particular valve used. The interpretation of this fact may, perhaps, be as follows: In the incandescent

carbon there is a continual production of electrons or negative ions by atomic dissociation. Corresponding to every temperature there is a certain electronic tension or percentage of free electrons. If the carbon is made the negative electrode in a high vacuum these negative ions are expelled from it, but they cannot be expelled at a greater rate than they are produced. Therefore, there is a maximum value for the outgoing current and a maximum value for the ratio of current to electromotive force—that is, for the conductivity.'

NOTE.—Eccles in his *Handbook of Wireless Telegraphy and Telephony* defines "electron" as "the 'atom' of negative electricity, the smallest quantity of electricity known to take part in electrical phenomena."

"Whether right or wrong in his theory, the result of Fleming's invention was to give the art a new, valuable and easily obtainable detector, which has gone into important commercial use. This Fleming detector is highly sensitive, quickly adjusted by an operator of even inferior skill, and only momentarily disturbed by static or strong signals. The thoroughness and earnestness of this litigation is its most significant testimonial.

"Nothing in the prior art urged by defendants in negation of invention calls for extended discussion. The Tesla patent (No. 645,576) and the Fessenden patents (Nos. 706,742, 706,743 and 706,744) were far removed from the incandescent lamp and were commercially useless; and nothing could be learned for this purpose from the Valbreuze and Zehnder tubes.

"Rectifiers of low frequency oscillations, such as those of Wehnelt and Cooper-Hewitt, taught nothing. These are rectifiers for commercial power frequencies, and it was not common knowledge, as of Fleming's date, that rectifiers of low frequency oscillations would rectify radio waves, nor is it a fact that all rectifiers of low frequencies are likewise rectifiers of radio high frequencies. Further, it was not common knowledge, as of Fleming's date, that a rectifier of radio oscillations would act as a detector. For instance, Pickard first attributed the action of crystal detectors to thermo-electric effects, but, when Pierce published his investigations in 1907, Pickard amended many of his patent applications to conform with Pierce's theory of rectification. (See Pierce *supra*, p. 162, and test of Pickard.)

"In the absence of a well-accepted theory of operation which needed merely some physical embodiment and, in the absence also in the art of the physical device itself, at a time when men of great skill were constantly endeavouring to bring forth an advance in this branch of the art, the contribution of Fleming was clearly invention and is entitled to liberal interpretation and consideration, unless impeded by De Forest.

"This brings us to the parent patent of De Forest No. 979,275, to which, on the evidence, the effective date of November 4th, 1904, must be accorded. Plaintiff is well justified in calling this and the divisional applications the Bunsen burner patents. Nowhere is there a suggestion of an incandescent electrode. On the contrary, in the specification and the drawings it is entirely apparent that De Forest pointed out only what the layman understands as heating gas. This De Forest stated in language which sounds impressive. He said :

" 'I have discovered that if two bodies adapted for use as electrodes or conductive members be electrically separated, partially or wholly, after the manner common in analogous devices, the separation between them may be neutralised sufficiently to enable them to act as a detector of electrical oscillations, if the intervening or surrounding gaseous medium be put into a condition of molecular activity, such, for instance, as would be caused by heating it in any manner, as by radiation, conduction, or by the combustion of gases in the space which surrounds the poles. Such condition or molecular activity causes what would otherwise be a non-sensitive device to become sensitive to the reception of electrical influences. I am thus enabled to emp'oy as such sensitive member devices which would otherwise be of no value, or to make those devices now used more sensitive to the electrical waves. This principle is embodied in the apparatus illustrated in the various figures shown.'

"Translated into plain English this meant, 'I will try to make the gas conductive between two electrodes by heating it to the dissociating point.'

"It was attempted to read incandescence into the specification, or rather to infer much that later knowledge has taught, but incandescent had long been a word of art and Fleming had no trouble in using it either in his specification or his Royal Society paper. Why not De Forest? Merely because the incandescent lamp detector was the farthest from his thoughts.

. . . .

"Before considering the patent No. 824,637 and its division No. 846,070, filed originally January 18th, 1906, it must be remembered that De Forest in December, 1905, knew of Fleming's Royal Society paper of March, 1905, as appears from a reference to that effect in his application for a certain patent not here in issue (No. 823,402) where he used the expressions 'exhausted vessel' and 'heated to incandescence.' Further, on December 21st, 1905, he instructed his solicitor to "look out for Fleming's recent patent.'

"The point is that what in effect defendants urge, *inter alia*, is that De Forest's idea of employing a local battery, which has come to be known as battery B, in any event, imparts invention to his patents, and its use by plaintiff amounts to infringement, or, if that contention be not sustained, then finally defendants do not infringe.

"With his knowledge of Fleming's theory it should have been very easy to describe the incandescent lamp detector plus battery B, but, in 824,637 De Forest now had in mind a receptacle enclosing a gaseous conductive medium. He said:

" 'With these objects in view my invention comprises a receptacle enclosing a sensitive gaseous conducting medium, the conductivity of which does not necessarily depend upon the heat of combustion, although such conductivity may be increased by heating said gaseous medium, and which in some cases requires practically no heating at all, a wave intercepting means associated with said gaseous conducting medium, whereby the feeble electrical currents or oscillations resulting from the energy absorbed from electro-magnetic signal waves may be impressed upon said gaseous conducting medium to alter its conductivity, and a signal-indicating device operatively connected with said gaseous conducting medium, whereby alterations in the conductivity of the latter may be made manifest.'

"The only possible reference to a vacuum is at p. 1, line 101–105, as follows:

'In all embodiments of the present invention the electrodes are enclosed and are surrounded by a *suitable gas* and they may be enclosed in a receptacle which *may* be partially exhausted.'

"The only reference to incandescence is in one compound word at p. 2, line 4, as follows:

"In Fig. 1 two filaments C which *may* be ordinary incandescent-lamp carbon filaments are sealed into the receptacle B. . . .'

"NOTE.—Italics mine.

"These 'mays' at best are meagre disclosures, but that these patents dealt only with the heated gas idea is clear from De Forest's correspondence with his solicitor in December, 1905, and January, 1906, from his ordering incandescent lamps from one McCandless in the same December and January, with his thereafter change of phraseology and tone (see No. 841,386 and his January 20th letter to his solicitor, 'keep it dark, but the new receiver is the best yet'), but most convincingly from the patent itself.

. . . .

"We now come to what I think is the only substantial question in the case—the infringement claimed against defendants.

"The Fleming Patent was originally framed in rather broad language so that it might have been construed as applying to other than radio uses in addition to its use in the radio art. By disclaimer filed in the Patent Office, November 17th, 1915, plaintiff disclaimed the combination of claims 1 to 6 inclusive, and claims 10 to 15 inclusive, except as the same are used in the radio art and to certain correlated words in the specification.

"The claims selected to sue upon were Nos. 1 and 37 because typical. They read:

'1. The combination of a vacuous vessel, two conductors adjacent to but not touching each other in the vessel, means for heating one of the conductors, and a circuit outside the vessel connecting the two conductors.'

'37. At a receiving station in a system of wireless telegraphy employing electrical oscillations of high frequency a detector comprising a vacuous vessel, two conductors adjacent to but not touching each other in the vessel, means for heating one of the conductors, a circuit outside of the vessel connecting the two conductors, means for detecting a continuous current in the circuit, and means for impressing upon the circuit the received oscillations.'

"NOTE.—In construing Claim 37 it must be remembered that 'continuous current' is used in its English sense of 1905 of a direct current, whether intermittent, varied, or not. (See also p. 2, line 109, of Fleming Patent). By a recent convention, continuous current now means a direct current of unvarying value.

"Claim 1 as limited by the disclaimer, is a broad claim for the incandescent lamp as a radio detector. Claim 37, in respect of which disclaimer was unnecessary, covers the detail applicable to a radio system—*i.e.*, a local circuit containing means for detecting a continuous (direct) current, such as a telephone or galvanometer, and means of impressing high frequency oscillations on the detector, such as the secondary of the oscillation transformer.

" Fleming's theory, as has already been stated, was that of rectification, while defendants account for the action of their ' Audion ' on the theory that it is a telephone relay or, in other words, that its products are alternating currents of ' Audio ' frequency and of the local energy and not of the ' imput ' energy.

" As a result of these differences the effect and relation of the local battery was one of the sharply contested points in controversy.

" It was satisfactorily proved that for some reason not yet understood incandescent lamps possess idiosyncrasies of operation, as demonstrated by a batch of a dozen lamps of identical dimensions made of identical stock, pumped at the same time for a vacuum and sealed at the same time. (Farrand's test ; Waterman, 1244 and 1820 *et seq.*).

" Of these, some worked best at the negative end—*i.e.*, without a battery—some with a small amount of battery, some with a battery equal to the battery for lighting the filament and some with a battery in addition to that used for lighting the filament.

" While, with care and time, lamps could be selected which would work best without a local battery, such a course would obviously be foolish commercially and unnecessary, when a simple and well-known means could be employed to utilise all the lamps, whatever their idiosyncrasies. This means was a local battery and a potentiometer, whereby a varying local potential may be applied to the lamps. The potentiometer is a resistance connected across the lighting battery of the detector so that any fraction of the lighting battery may be tapped off and applied to the local circuit. The local battery is used to bring the lamp detector to the sensitive point of its characteristic curve and the potentiometer is the simple and effective device which, varying the local battery, accomplishes this task.

. . . .

" Plaintiff is undoubtedly entitled to use the Fleming detector with a well-known instrumentality and, therefore, to employ the variable local battery, for practically all the prior art detectors required local batteries to locate the operating points. Plaintiff is likewise entitled to use the Fleming device in the ordinary detector circuits of the prior art. The circuits of the Marconi patent No. 627,650 are the specific circuits which plaintiff has used and the modern operative Fleming device has simply been substituted for the coherer in old and familiar circuits (Q. 145,146 *et seq.*).

" Defendants alleged infringing device in the so-called P.N. Type Audion De Forest Detector.

. . . .

" Of all the explanations of the action of the De Forest Audion that of Armstrong in the *Electrical World* (December 12th, 1914, Plaintiff's Ex. 45) seems most convincing, and that article, for purposes of brevity, may be regarded as being read into this opinion. (See also Dr. Austin's bulletin of the Bureau of Standards of the Department of Commerce and Labour).

" In reading this literature it must be remembered that both sides agree that the De Forest two-element and three-element bulbs operate on the same principle.

" As Armstrong was on the stand and subject to cross-examination his article is to be treated not merely as a scientist's essay but as equivalent to testimony.

. . . .

"Within the limits of an opinion it is, of course, impossible to analyse at length a mass of experiments, tests and theses and an infinity of detail necessarily involved in the testimony of experts in an art of this kind; but, if plaintiff's theory that its own device and that of defendants operate on the same principle has not been proved (and I think it has as far as such proof is yet possible), at least defendant's theory has not been satisfactorily demonstrated, and finally, the physical facts all support plaintiff's claim.

"Here, as is so often the case in law suits, resort is had to the story of events and the outcroppings of human nature.

"De Forest had long been proceeding on a theory different from that of Fleming. Having read Fleming's article, he began to experiment with the incandescent lamp. He probably doubted its efficacy at first, but within a very short space of time—perhaps a week, perhaps a month—he changed his mind and, discovering that Fleming was right, wrote his solicitor, after he had filed his application for No. 824,637, that the 'new receiver is the best yet.' Thereafter he used the language of the incandescent lamp and, in an address on October 20th, 1906, before the American Institute of Electrical Engineers, really described fundamentally the Fleming lamp detector although using phraseology which has since become Audion vocabulary. Thus, the physical ocular fact is that in the alleged infringing P.N. device, the Fleming detector and not the Bunsen burner is used, and the broad Claim No. 1 of the Fleming patent is infringed, precisely the same as if a patented crystal has been placed in some old or new type of circuit with a local battery, such, for instance, as the Weagant and Armstrong circuits.

"In respect of Claim 37, defendants' device does not escape because the circuit outside the vessel is divided into two branches nor because Fleming's detector of a 'continuous current' was a galvanometer and De Forest's is a telephone long well known in the art.

"De Forest in his three-electrode Audion has undoubtedly made a contribution of great value to the art and, by the confession of judgment in respect thereof, defendant company may enjoy the just results of this contribution; but, on the other hand, Fleming's invention was likewise a contribution of value and is to be treated liberally and not defeated either by unconfirmed theory or by association in apparatus where later developments have taught how other useful adjuncts can be employed.

"Claims 1 and 37 of plaintiff's patent are valid and infringed by defendant company; defendants' counter-claim will be dismissed and, as there is no evidence against De Forest individually, the bill as to him will be dismissed.

"(Signed) Julius M. Mayer,

"District Judge."

HEROIC WIRELESS OPERATORS

SOME NOTES ON THE ACHIEVEMENTS OF SHIPS' TELEGRAPHISTS WHO PERFORMED THEIR DUTY IN THE FACE OF EXTREME PERIL

LIFE-SAVING has from the first constituted the brightest jewel in the crown of success won by wireless. Senatore Marconi counts as the most precious reward of his efforts the ever-increasing roll of victims snatched from death through the instrumentality of his genius. Mr. Godfrey Isaacs never fails to call the attention of the Marconi shareholders to the gallantry displayed by the young operators in the employment of the Company. "It speaks volumes," said he at the 1916 meeting, "for the noble inherent qualities of our young "men that from the moment they are given serious occupation and "responsibility, in no single instance, has one of them been found "wanting in the moment of peril."

It is always invidious to make *any* selection where all are meritorious: it is especially so when one attempts to make selections amongst those who have "quitted themselves like men" in the dark hours of danger and distress. In presenting our readers with our present little portrait-gallery of six wireless men who have won official recognition for extreme gallantry during the period covered by our volume, we would emphasize the fact that they are typical of, and not exceptions to, their numerous comrades of the Marconi service at sea. The brief summary below indicates the nature of their respective claims to a place on our page for 1916; as far as the order is concerned, that which we follow is alphabetical:

OWEN CHICK was 24 years of age, and had served the Marconi Company since November, 1915, when he sailed in the *San Melito, en route* to Mexico in August, 1916. She was an oil tanker, outward bound for a cargo of petroleum, and, when steaming down Channel, found herself, without the slightest warning, under fire from a German submarine at about 250 yards' range. Flying splinters struck the captain down, and Mr. Piper, the chief officer, took the helm. For forty minutes the gallant operator and his comrades stuck to their exposed posts on the upper deck, attending to their duties, whilst the SOS signal ceaselessly radiated from their aerials. The vessel was saved, and Mr. Chick—in common with his comrades—received not only a cheque for his services, but a silver model of a German submarine as a memento of the occasion.

EDWARD WALTER DYER was one of the wireless operators on the British transport *Royal Edward*, when, on August 14th, 1915, she was torpedoed by an enemy submarine whilst bound for Gallipoli. Although but 21 years of age, Mr. Dyer had, since he joined the Marconi Service in 1914, served on five other vessels before he joined the *Royal Edward*. He stuck to his post to the last, and—whilst struggling in the water after

the vessel sank—received injuries so severe that he was obliged to have one of his legs amputated. Mr. John Keir, his fellow operator, escaped with contused ribs, having been crushed between two collapsible lifeboats.

John McMillan is now 24 years of age, having served the Marconi Company since June, 1913, on four ships, before receiving his appointment to the s.s. *Wayfarer* in March, 1915. The safety of this Harrison liner, which was attacked by German under-water craft in the earlier part of 1915, was due to the promptness with which wireless enabled her to summon assistance ; and the British Admiralty gave practical testimony to their sense of Mr. McMillan's gallantry in carrying out his duty, under circumstances of an exceptionally trying character, by donating him with a presentation watch ; in addition to which the owners of the vessel testified their gratitude by a monetary reward.

Ronald Charles Older was one of the younger members of the Marconi staff at the time when he was serving on the s.s. *Goldmouth* on the occasion of her being torpedoed by an enemy submarine. He had transferred from the *Gaika* to the *Goldmouth* little less than a year before the destruction of the latter, and his gallantry on the occasion of the sinking of his ship caused him to receive the distinction of being gazetted for his services. Mr. Older was seriously injured in his foot by a shell in the execution of his duty on that occasion, and has since had the misfortune to suffer amputation.

Arthur John Proughton was wireless operator on Messrs. Elder and Fyffe's liner *Zent*. As the vessel was, on April 5th, 1916, making her way down the Channel, suddenly, without the slightest warning, two torpedoes struck the vessel on the starboard side at short intervals. The *Zent* foundered and disappeared completely in about two minutes. Immediately on the first explosion Mr. Proughton sent out the distress call, using the emergency set, as the ship's dynamo was destroyed by the first explosion. This gallant young man was never seen again ; but his call was instrumental in assuring the safety of eleven survivors out of a crew of sixty. Such was the indignation of the master and mates of the *Zent* at the dastardly outrage of which they were the victims, that they caused to be drawn up by a notary public, in legal form, a " Public Instrument of Protest," wherein they spoke with grave emphasis of the way in which "the brave gentleman's life was sacrificed to his duty." This document has been lodged with Messrs. Elders & Fyffes, the owners of the vessel.

John Rea was the operator on the *Anglo-Californian* when she was for four hours subjected to a hot fire from an enemy submarine. The telegraphist discharged his duty during part of the time " lying on the floor with broken glass all around him, the place stinking with gunpowder." The British Admiralty wrote to the owners of the vessel, paying high tribute to the officers and crew, and especially commending the behaviour of Mr. Rea, who was presented by them with a gold watch, suitably inscribed, in recognition of his conduct. He also received the honour of a mention in the *London Gazette*.

SHIPS' TELEGRAPHISTS WHO PERFORMED THEIR DUTY IN THE FACE OF EXTREME PERIL.

(For brief notes of their respective achievements see pages 661-2.)

[*To face page* 662.

THE ELECTRIC ARC AS A GENERATOR OF PERSISTENT ELECTRIC OSCILLATIONS.

By Dr. J. A. Fleming, F.R.S.

THE necessity of obtaining some simple method of producing high frequency persistent or undamped electric oscillations for the accomplishment of wireless telephony was evident at an early stage in the development of radio-communication. At that date the improvements in high frequency alternators had not proceeded much beyond the point at which they had been left by Tesla, and the special construction of such an alternator for any suitable radio-frequency makes it in any case an expensive machine. The early experiments of Elihu Thomson in 1892, in which a direct current discharge under a voltage of 500 volts was made to take place between spark balls, shunted by a condenser in series with an inductance, had not been followed up, and it was not until 1900, when Duddell first described his so-called musical arc, that the power of the direct current arc to become a generator of high frequency persistent oscillations was generally recognised. Duddell formed a D.C. arc between solid carbon rods, the arc taking from 3·5 to 5 ampères; and a certain metallic resistence of 30 to 40 ohms was placed in series with it. When this arc was shunted by a condenser having a capacity of 1 to 5 microfarads placed in series with an inductance of about 5 millihenrys, he found that persistent oscillations were created in the condenser circuit; at the same time the arc produced a shrill, whistling sound. The pitch of this sound could be varied by changing the capacity of the condenser, and appeared to correspond to the natural frequency of the condenser-inductance circuit, which in this case was about 1,000. Duddell recognised that the condition for the production of such oscillations is that the arc itself as a conductor must have a falling characteristic curve; that is to say, it must possess a quality such that, if the current through the arc is increased, the potential difference of the carbons is decreased, and *vice versa*.

In the succeeding years a considerable amount of experimenting and discussion took place on this musical arc, but it did not appear that such an arc between solid carbon electrodes was capable of producing oscillations of very great energy, and yet of sufficiently high frequency to be suitable for radio-telephony. In 1903 V. Poulsen applied for patents covering an application to wireless telegraphy of a discovery which proved to be of importance. He found that if the arc was formed in an atmosphere of hydrogen or hydro-carbon vapour, and if the electrodes were carbon and copper, the latter being the positive electrode, oscillations of great energy and frequency of the order of a million or so could be created in a suitable condenser-inductance shunt circuit. Subsequently it was found that a strong transverse magnetic field across the arc was of great assistance.

This discovery, when public attention was drawn to it about 1906,

stimulated fresh interest, and it was even declared to be the death of spark radio-telegraphy. Such, however, has not been the case, but it may be of interest to examine the physical processes taking place in this arc-oscillation generator with the object of seeing if further improvement in it is possible.

We start, then, with the attempt to visualise these processes in the light of the electron hypothesis of electricity. It is usually assumed that the substances we call conductors contain in their interatomic spaces free electrons, or atoms of negative electricity. These electrons are in diameter only about one hundred-thousandth of the diameter of a chemical atom, and in most metals the free electrons are supposed to be about as numerous as the atoms—viz., about 10^{23}, or, say, about one billion billion in every centimetre cube of volume.

These free electrons are not at rest, but in rapid motion in all directions. In copper they have a mean velocity of something of the order of sixty miles a second. There are good reasons for the opinion that what we call the temperature of the conductor depends solely upon the kinetic energy of motion of these free electrons. Again, if we cause a general drift of the free electrons in one direction, which may be super-imposed on their irregular motion, this constitutes an electric current in the conductor, such current being measured by the resultant total number of electrons which cross any section of the conductor per second.

Furthermore, the flow of heat in a conductor consists in the transfer of electronic energy from places where it is large to places where it is small, whilst the flow of electric current consists in causing an inequality in the number of the electrons which pass in opposite directions per second across any section of the conductor.

Accordingly, one part of the body is at a different temperature to another when there is a difference in electronic energy per unit of volume, and one part is at a different electric potential to another when there is a difference in electronic pressure or number of free electrons per unit of volume. The electrons tend to drift from the place where they are most crowded under greatest pressure to places where they are in deficit or under less pressure. Accordingly, in a solid conductor the drift of electrons is proportional to the difference in electronic density or pressure—that is to say, the current is proportional to the potential difference of the two places. This is Ohm's law. Therefore the *characteristic line* or *curve* is a straight line, and current increases without limit with voltage until the material melts or evaporates.

If, however, we consider a gas or vapour, then this body is not a conductor unless there are in it free negative and positive charges called *ions*. The molecules of a gas can be ionised by the impact of electrons or ions thrown into them, and in other ways, as by ultra-violet light or Röntgen rays.

Let us consider the case of a gas bounded by solid electrodes which can be heated, one of which is electrified positively and the other negatively. Then the incandescent negative electrode emits electrons. These ionise the gas, and the negative ions are pushed towards the positive electrode and the positive drawn towards the negative electrode. If, then, we increase the electric force in the gas the ions will be separated or made to migrate in opposite directions more quickly,

and if they are removed from the field as quickly as they are produced the current will be stationary, and will not increase beyond a certain strength called its saturation value. Hence, in a gaseous conductor the current does not increase steadily with the potential difference of the electrodes, but tends towards a limiting value. Also it is clear that as the ions are moved towards the electrodes, unless these latter remove them or absorb them sufficiently quickly, the accumulation of negative ions near the positive electrode and of positive ions near the negative electrode will diminish the potential difference of the electrodes and create a condition in which increase of current—that is increase in migration of ions—causes a decrease in the potential difference of the electrodes. In this case, then, we shall have a falling characteristic or volt-ampère curve.

This state of things exists in the electric arc. When the two carbons are first brought together to start the arc, the contact resistance causes their tips to become incandescent. From the negative carbon, assuming a D.C. voltage applied, we have an emission of electrons which ionises the air and the carbon vapour which exists between and around the carbon points. Therefore, when these electrodes are separated we have the above-mentioned conditions fulfilled. There is a continual liberation of electrons from the negative carbon, and of positive from the other carbon. These ionise the carbon vapour and liberate more ions. The potential difference of the carbons causes these positive and negative ions to migrate in opposite directions.

It would appear, however, that they are not absorbed or taken up or neutralised at the electrodes instantly. Hence, if the current increases, the accumulation of ions reduces the potential difference of the carbons, and the result is a falling characteristic curve.

There is therefore in the arc a double transport of matter. Negative ions or electrons are moving from the negative to the positive pole, and positive carbon ions, which are heavier and slower in movement than the negative, are moving towards the negative pole. The result is an erosion of the positive pole which forms the crater, and a less rapid wear of the negative, or maybe a deposit on it of carbon, which forms the " mushroom " tip.

If the arc is formed in air, then there is also an oxidation of the incandescent carbon. The hot positive carbon ion, which has a strong affinity for the negative oxygen ion, unites to form carbon dioxide, one quadrivalent carbon ion combining with two oxygen ions to form CO_2. In this manner many of the positive carbon ions which would otherwise collect on the negative electrode are prevented from reaching this electrode, being oxidised on the way. The characteristic curve is therefore not very steep, and an increase in the current does not result in a sensible decrease in the potential difference of the electrodes.

If, however, the arc is formed in an atmosphere of hydrogen or hydro-carbon, which excludes oxygen from reaching the arc, then this removal or re-composition of positive carbon ions does not take place, and the characteristic curve has a steeper downward slope.

It was shown by experiments carried out by Mr. W. L. Upson in the writer's laboratory in 1907 that this steepening of the characteristic curve takes place when a carbon-copper arc is formed in hydrogen in place of air, the carbon electrode being the negative one.

In order that an arc may take place or be maintained it appears to

be essential that the negative electrode shall be kept incandescent. If it is cooled, then the arc is only maintained with great difficulty. On the other hand, the positive electrode can be cooled with advantage as far as regards increasing the slope of the characteristic curve—that is to say, increasing the value of dv/di where v is the electrode potential difference and i is the arc current. Accordingly Poulsen found it best to form his arc between a carbon rod as the negative electrode and a water-cooled copper rod as the positive electrode. One may ask at this stage why a steep characteristic curve is of advantage, and to answer this question we must consider a little more in detail what takes place when the arc is shunted by a condenser and inductance. Consider, then, a continuous current carbon arc so shunted. The moment when the condenser is joined to the two arc electrodes electricity flows into it, and this momentarily reduces the current through the arc. This action is accompanied by an immediate increase in the potential difference of the carbons, and this again results in more current flowing into the condenser. Hence the condenser becomes charged to the full voltage or potential difference of the carbons. This condition is, however, unstable. The condenser begins at once to discharge back through the arc, thus increasing the arc current. The result is that the potential difference of the carbons decreases and the discharge is still more facilitated. If, then, the condenser is in series with an inductance the effect is to cause an over-discharge of the condenser equivalent to a reverse charge. The whole cycle of operations then repeats itself, and the condenser-inductance circuit charges and discharges with a frequency determined by the natural frequency of this circuit as fixed by its inductance and capacity. Hence the condenser circuit oscillates, but the energy to maintain these oscillations is drawn from the battery or dynamo supplying the direct current to the arc. The arc thus becomes a transformer of direct to alternating current.

The whole action exactly resembles that of an organ pipe. In this latter case we have a unidirectional blast of air supplied by the bellows. This corresponds to the direct arc current. Then when this jet of air meets the lip of the pipe it sets up aerial waves of compression or rarefaction which travel up and down the pipe. These waves cause the jet of air to so move into or out of the mouth of the pipe as to maintain them. The action becomes, therefore, self-sustaining as long as the air jet supplies energy. We have a conversion of energy in the form of a continuous jet of air partly transformed into energy in the form of aerial oscillations in the pipe.

Returning, then, to the arc, we must notice that of the arc characteristic curve is not very steep. We can, therefore, only charge and discharge a condenser to a low voltage, but if we are to set up oscillations of any sensible energy this implies that the capacity of that condenser must be rather large, and hence that the oscillation frequency will be small. Using a 5-ampère carbon-carbon arc, Duddell found that the capacity of the condenser used had to be of the order of a microfarad or so, and that it was not easy to obtain with such an arc an oscillation frequency much above 10,000.

But this is not high enough for wireless telegraphy or telephony The advantage of the steep characteristic is that it enables us to use a relatively small capacity in the shunt, and to obtain, therefore, high-

frequency oscillations, and yet give these oscillations considerable energy. Poulsen's discovery of the effect of an atmosphere of hydrogen or hydro-carbon on the arc characteristic therefore made it possible to obtain from such an arc oscillations of a frequency of the order of one million or so, suitable therefore for radiotelephony.

It was also found that the energy of these oscillations could be increased by the use of a strong transverse magnetic field. This field lengthens the arc by projecting it sideways in a crescent form. Hence it increases the resistance of the arc, or reduces the current for a given potential difference of the carbons.

The magnetic field tends, on the other hand, to make the arc unstable and easily ruptured or destroyed. This magnetic field seems, however, necessary when the arc used takes large current and power.

At this stage it should be pointed out that the difference of potential of the arc electrodes when shunted with a condenser and inductance in series, as measured by an alternating current voltmeter, may be many times greater than the same P.D. measured with a direct-current voltmeter.

For if V_0 is the P.D. as measured with the D.C. instrument and if V_1 is the root-mean-square value of the true alternating P.D. as measured at the terminals of the condenser, then the reading V of an electrostatic voltmeter joined to the two electrodes would give a value :

$$V=\sqrt{\frac{1}{T}\int_0^T(V_0+\sqrt{2}\ V_1 \sin pt)^2\,dt}=(V_0^2+V_1^2)$$

where the frequency of the oscillations is $n=p/2\pi$. Hence $V^2=V_0^2+V_1^2$ and V may be much greater than V_0. This leads us to notice also that, as shown by Mr. F. Mercer, there is a certain best ratio between the capacity of the condenser and the inductance used in the shunt circuit. The steadiness of the oscillations, according to Mercer, depends upon this ratio, and the arc is not steady either with very small capacity and large inductance or *vice versa*. In the first case, however, we shall have small output and in the second case small frequency.

Mr. N. W. McLachlan has also shown that with given resistance and capacity in the condenser shunt circuit there is a certain inductance, and therefore frequency, for which the efficiency of the arc as a converter from direct to alternating current is a maximum.

For small power absorbed in the shunt circuit of above 200 watts this efficiency appears to be about 38 per cent. or so. This shows that a considerable fraction (more than half) of the power supplied to the arc is dissipated as heat in incandescent vapour and in the electrodes.

It does not seem, therefore, in any case that the arc considered as a transforming device is very efficient.

We may next consider briefly some of the practical details. In the ordinary Poulsen arc apparatus the arc itself is formed inside a box, preferably water-cooled, but which may also be air-cooled by radiator flanges. The carbon electrode should be a rather massive carbon, which is rotated slowly by a motor or by clockwork. The copper electrode is a water-cooled copper tube with a replaceable copper beak on the end from which the arc starts. The arc box is mounted on an electro-magnet, and soft iron pole pieces project into the box so as to form a very strong magnetic field across the arc. The necessary

hydrocarbon vapour can be produced by allowing alcohol or some other volatile hydrocarbon liquid to fall drop by drop into the box.

If a gas or liquid hydrogen is supplied which is too rich in carbon the result is to form a deposit of carbon on the electrodes, which alters the arc length or bridges across. In some radiotelephonic experiments MM. Colin and Jeance used a mixture of hydrogen and acetylene in certain proportions, so chosen that there was no sensible wear of, or deposit of, carbon upon the carbon electrodes.

In a form of arc generator devised by the author the copper electrode consists of a copper cylinder closed at the top except for a small hole. This fits over a vertical carbon rod like an extinguisher over a candle, and the two are immersed in oil in a metal vessel, the oil being sufficient just to come up to the level of the top of the carbon. The arc is formed between the top of the carbon and the inside of the top of the copper cylinder. A series of four or eight such copper-carbon electrodes can be joined in series, and contained in a single vessel of heavy mineral oil. The vapour from that oil supplies the necessary hydrocarbon atmosphere. In another form of arc generator by Moretti the arc is formed between the end of a copper rod and a water surface formed by water rising up through a copper tube.

Finally, other experimentalists, such as Jahnke, have formed an arc under a liquid hydrocarbon.

The conditions necessary for obtaining oscillations of a frequency suitable for radiotelephony seem to be that the arc shall be formed in an atmosphere not containing oxygen, and that the capacity and inductance in the shunt circuit shall be so adjusted that the natural frequency of that circuit shall not be less than about 250,000, whilst the ratio of the inductance reckoned in centimetres or electromagnetic units to the capacity reckoned in centimetres or electrostatic units shall be at least 20 or even 40. Under these conditions we obtain oscillations in the shunt circuit suitable for radiotelephony. Nevertheless, there are some very unsatisfactory features in the carbon arc generator. It is almost impossible to maintain perfect steadiness in the arc current. Again, for some reason there are discontinuities or interruptions in the steady flow of oscillations. The consequence of this is that when the oscillations are transferred to an aerial and made to radiate electric waves the stream of waves is not absolutely uninterrupted nor perfectly constant in amplitude. The result is that there are irregular noises in the receiving telephone which obscure or disturb the speech transmission.

It is impossible to secure good telephony under these conditions. Hence, although the arc generator has been able in the hands of experts to make remarkable demonstrations in radiotelephony, it cannot possibly be said to have arrived at a condition of commercial success.

The chief utility of radiotelephony, if it can be effected with simple, easily managed apparatus, would be in inter-ship and shore communication.

The high-frequency high-speed alternator is out of question for this purpose on board ship, and the arc method, though simple, has not yet been freed from the difficulties above mentioned.

This, of course, does not apply to land stations, and the small irregularities in the arc current do not matter for radiotelegraphy in Morse code signals. There has, therefore, been a certain use for the arc

generator in connection with long-distance radiotelegraphy. The writer is, however, of opinion that as regards radiotelegraphy some mechanical means of creating closely sequent or uniform musical spark discharges as by Marconi's high-speed disc dischargers provides a more simple, efficient and easily controlled transmitter appliance for radiotelegraphy. As an alternative the employment of high-speed alternators to create undamped waves seems in every way preferable to the arc method, and admits equally of the employment of heat reception with its advantages in the facility for the elimination of atmospherics and vagrant or alien waves. For radiotelephony over short distances some modification of the thermionic generator employing a double anode or grid and plate in conjunction with a Fleming incandescent cathode in vacuo seems to promise best.

The microphonic control of the amplitude of the oscillations produced by a high-frequency alternator by a magnetic amplifier on the plan proposed by Messrs. Alexanderson and Nixdorff seems to open up a new field of research, and one which may help to make long distance radiotelephony more nearly a practical matter.

There are, however, possibilities in the arc generator, if only some means can be found of creating an absolutely steady arc, in connection with radiotelephony. The most promising of these seems to be in the further study of the production of the arc in vacuo between liquid electrodes as in the mercury vapour arc.

The real cause of the difficulty in connection with the metal-carbon arc in hydrogen or hydrocarbon seems to be in the continual tendency of the arc to change its place of origin on the carbon, and hence to create continual variation in the potential fall down the arc or at the cathode surface.

What is required first is a far more thoroughly scientific research into the physical phenomena attending the production and maintenance of the arc between solid and liquid electrodes especially directed to finding some mode of producing a perfectly steady arc discharge with very steep descending characteristic or volt-ampère curve.

THE WIRELESS DRAMA

By Alfred Noyes

THE world at large hardly realises the immense changes which have been wrought in its own life by the invention of wireless telegraphy. The greatest changes always come quietly, and the new era has dawned without our knowing it, an era as different from that which preceded the invention of "wireless" as the age of steam from all preceding ages. But the change has been far more quiet than any other of the historic world-changes; perhaps because it is the most important of them all. The few people who have practical knowledge or experience in the subject are, of course, wide awake to the change; but the great majority of people look upon "wireless" as a mere adjunct to the more ordinary telegraphic methods, and probably as a less satisfactory and certain one. The simplicity, and, at first sight, the seeming triviality, of the apparatus employed has probably something to do with this. Certainly it is not realised that space and time have practically been annihilated by the discovery that messages can be sent at a pace of two hundred thousand miles a second; so that a message from Europe may reach America in about one-sixtieth part of a second. Nor is it realised to what an amazing extent the whole world has been quickened into organic unity by this single invention. It is as though the body of civilisation (and Germany) had acquired a great nervous system. It is a significant fact that, despite even the conflict of Armageddon, the processes of science are knitting our world more and more closely into an organised body. The messages, the news, and the Arabian fairy tales transmitted as news by Germany, are instantaneously read and written down by every one of her enemies. The world has become much more than "a whispering gallery." It is more comparable with a single human body and mind. Even when we are at war it is like a mind at war with itself, endeavouring to suppress a criminal instinct or a vicious passion. I know nothing more strongly enthralling than the first actual experience of this ethereal contact with our enemies. It happened to myself quite unexpectedly at a flying school in the West of England. It was a day of wild rainstorms and endless mud. The place was one of the loneliest, and nothing could have seemed more remote than the battlefields of Europe. I went into one of the little wooden huts, and there was a young operator quietly writing down a German message (probably a romantic one) direct from Berlin. I was allowed to listen for a short

time to the buzzing of the code; and, though it was strange to realise that one was listening to sounds made in Germany, it was even more strange to realise that this intimate whispering and listening was going on all over the world night and day.

The centre of the romance of wireless is probably the apparatus on the roof of the Admiralty in London. Some day one hopes that it may be written; for, if it were done adequately, it would surpass the most glowing tales of Hakluyt. The crowds that pass that sober old building in Whitehall hardly guess at the sheer intensity of the wireless drama that has been enacted there, without any cessation, since the beginning of the war. Probably the actors in the drama have grown so used to it by this time that they hardly notice it. Yet, as the messages come in from ships at sea, messages of warning, messages of appeal, messages of death, or as the messages go out, directing packet-boat and liner, patrol-boat and cruiser, or giving clues to the incessant hunt for the submarine, it is probably true to say that there has been no such centre of sheer drama in the world's history; and this is chiefly due to the invention of wireless. If Shakespeare were living to-day he would find there such exits and entrances as hitherto would have been impossible in the world of space and time.

The influence of all this upon naval strategy needs no comment here; it is a matter for strategists, and the best strategy for those who are not experts is silence. Perhaps we shall win the war when this is generally accepted.

But, on the human side, the development of wireless is of the most enthralling interest. It used to be said that the romance of the sea was offset by its monotony, the severance for long periods in mid-ocean from the rest of humanity. To-day our ships maintain an incessant conversation directly with each other, and indirectly with all the capitals of the world; and it needs no modern dramatic critic to tell us that these conversations are often the essence of the most intense drama.

It is a significant fact that, in the Admiralty records of ships attacked by the "U" boat, a large number of masters report that the enemy's first attempt was to destroy the wireless aerials by gunfire; and the adventures of the wireless operators are among the most stirring tales of the world-war. The *Anglo-Californian* owed her escape entirely to the pluck of the operator, who was in an exposed position abaft the bridge, while the ship was being chased by a "U" boat. He sent out calls for help, and was answered by various men-of-war beyond the horizon. Then there followed the most amazing conversation that was ever recorded in fact or fiction.

The men-of-war cross-questioned him on every detail of his ship's course, speed and appearance; every detail of the pursuing submarine also. He replied with wonderful promptness and precision, adding

fervently, "Hurry up, for God's sake. Submarine firing like blazes." He received the reply: "I am *Cryptic*. Coming 33 knots. Can you see my smoke?"

Cryptic then gave him instructions as to the best course to steer; and, at one stage, was able to prevent the captain abandoning the ship by the sheer encouragement of the wireless. The captain had actually stopped, owing to the severity of the fire, when the wireless message came, urging them to hold on.

The submarine redoubled her bombardment as soon as the ship proceeded. The operator's gear was flying all about him; and once he sent a message to the *Cryptic* saying, "Cannot hear you. Concussion. Am lying on the floor. Broken glass all round me."

The *Cryptic* replied: "Keep your pecker up, old man. Am firing to scare him. Can you report result?"

The operator carried out his instructions lying on the floor, and reported also the wounded men on his own ship. This wireless drama worked up to a climax when he sent the message: "Hurry, hurry, hurry, submarine getting abeam to torpedo us"; and then, as the wisp of smoke on the horizon grew into something like a ship, the "U" boat took fright and dived. The story did not end here, for the next message from the *Cryptic* was, "report her trail at intervals." But, as for the *Anglo-Californian*, the operator's final message made a happy ending: "I hope she stops down. It was getting hot here. Don't worry about us. Destroyers now alongside."

This was a case where the ship was actually in process of abandonment when the "wireless" came to the rescue. Possibly, also, it was a case where the "U" boat was bagged; for, owing to the same invention, her position was very precisely reported to a considerable number of armed ships. The reader who wishes to know the value of wireless in our naval operations may simply multiply this case by the thousand, for it is typical of what is happening night and day over a great part of the world. It is hardly too much to say that "wireless" has arrived in the nick of time to save Britain from losing the command of the seas.

To listen in the wireless room of a ship at sea during a storm is a most illuminating experience. To hear distant ships talking, without the slightest difficulty, through the wildest weather, by means of that mysterious ether, is the nearest approach one can make to the realisation of "other worlds than ours." A man would have to be a very hardened sceptic who would deny, after that experience, the possibility of "spiritual" discoveries, even to men walled round with flesh. These are deep waters, and I shall not attempt to fathom them here or to explore them further; but there are aspects of the world revealed to us by "wireless" which certainly renew our sense of the eternal miracle of the universe and our own existence.

MR. W. W. BRADFIELD, MANAGER OF THE MARCONI WIRELESS TELEGRAPH CO., AND OF THE MARCONI INTERNATIONAL MARINE COMMUNICATION CO.

(For whose Biographical Notice see page 874.*)*

[*To face page* 672.

Now, to those who search the deep—
  Gleam of Hope and *Kindly Light*—
Once, before you turn to sleep,
  Send a message through the night.
Never doubt that they'll receive it.
Send it once, and you'll believe it.

Think you these aerial wires
  Whisper more than spirits may ?
Think you that our strong desires
  Touch no distance when we pray ?
Think you that no wings are flying
Twixt the living and the dying ?

Wrecks that burn against the stars,
  Decks where Death is wallowing green,
Catch the breath among their spars,
  Hem the flickering threads between,
Quick, through all the storms that blind them,
Quick, with worlds that rush to find them.

* * * * *

You shall guide the darkling prow,
  Kneeling—thus—and far inland ;
You shall touch the storm-beat brow,
  Gently as a spirit hand ;
Even a blindfold prayer may speed them ;
And a little child may lead them.

Alfred Noyes.

IONIC VALVES

By W. H. Eccles

THE vacuum tube as used in modern wireless telegraphy is one of the most striking examples of applied physics, for here some quite recondite regions of molecular physics are carried into actual manufacturing processes. In order to understand the uses of these vacuum tubes, and especially to plan new developments, some acquaintance with molecular theory is required. In this article a sketch of these internal actions as well as of the external circuits of modern valves will be attempted, and therefore we must start with a brief account of the theory of the motion of ions in vacuum tubes.

First, however, a remark on the nomenclature of these vacuum tubes is necessary. At present great diversity exists, and no term is universally accepted. Sometimes they are called " three electrode valves " (or " two electrode valves " as the case may be), sometimes " audions," sometimes " double anode valves," sometimes " gas relays " or " vacuum relays " or " electron relays " or " ionic relays," and instead of the word " relay " the word " amplifier," " magnifier " or " repeater " often appears. In allusion to the fact that one of the electrodes, namely, the cathode, is maintained at a high temperature, these tubes are often called " thermionic tubes, bulbs, relays, amplifiers, etc." The term " ionic valve " is general enough to include all types. If it were not for the fact that the name " audion " is so often used almost as a trade name, this name, invented by de Forest, would be a very convenient one.

An ion is a wandering particle of molecular or smaller dimensions capable of carrying electricity. Usually it does not come into notice in the operation of valves unless, and until, it is charged electrically. The principal kind of ion is, however, the atom of electricity usually called the electron. It is a disembodied negative charge quite devoid of matter. Electrons have the same properties whatever the material substance from which they are derived. Positive ions, on the other hand, are, so far as is yet ascertained, molecules of matter minus an electron. The existence of positive ions in a valve makes the theory of the apparatus very complicated, but appears to be essential for the operation of certain types of tubes. They appear in the tube unavoidably if the methods of pumping available, or if the methods adopted for cleaning the interior of the tube, and the electrodes, are imperfect; or they may be intentionally introduced into a highly perfect vacuum by the admission of gas. For simplicity, we shall start with the supposition that the ionic valve to be studied first is perfectly evacuated and that the solid parts—namely, glass and metal, are absolutely free from occluded or adsorbed gas. In such a tube containing a hot filament and one or more other electrodes, the whole of any current that is passed through the tube from a positive electrode (anode) to the filament, which is the negative electrode (cathode), is conveyed by ions that are all electrons. Such a current is frequently spoken of as a pure electron discharge.

Thermionic theory shows that if the incandescent filament is abso-

lutely clean, and if the vacuum is perfect, the rate of emission of electrons from each unit of area of filament surface can be calculated from the molecular theory of gases and the electronic theory of conductors. On this latter theory, every conductor always contains a large number of free electrons interspersed between its molecules. The electrons are much smaller than the molecules, but share with them the irregular vibratory motion which we call heat. The electrons are at ordinary temperatures almost perfectly confined to the inside of the conductor by the inward attraction that exists at the surface of all solids. But as the temperature is raised the vivacity of the motion of both molecules and electrons increases till, at 1,000° C. large numbers of electrons are continually breaking their way through the surface of the metal. The process is very analogous to the evaporation of a liquid, but in that case material molecules are escaping from the surface and forming vapour. Considerations such as this led O. W. Richardson to the equation

$$i = a\,T^{\frac{1}{2}}\,e^{-b/T}.$$

where i is the current of negative electricity that escapes from the sq. cm. at the absolute temperature T, and a and b are almost constant. When certain possibilities of the variation of a and b with temperature T are taken into account the formula becomes

$$i = c\,T^2\,e^{-d/T}$$

where c and d are constants depending on the metal from which the electrons are escaping. K. K. Smith has found the values $a = 6{\cdot}7_4 \times 10^8$, $b = 54700$, $d = 52000$ for tungsten with vacua in which the pressure was as low as a millionth of a millimetre of mercury. I. Langmuir found $a = 3.4 \times 10^7$, $b = 55500$ with a pressure of about one ten-thousandth of a millimetre of mercury. Thus the gas pressure has great effect at extremely high exhaustion. The current conveyed, it may be noted, is that which flows from the sq. cm. if all the electrons are continually removed. If they are not removed, if the space into which they escape is a limited one such as a bulb, and if no provision is made for their absorption, the electrons wander about with velocities similar to those of the molecules of a gas, ultimately returning to the metal as fast as they escape. It is clear that if the space round a hot filament is occupied by electrons, the electric repulsion of this space-charge exerted on electrons just escaping from the metal will tend to prevent them escaping, or will push them back into the metal after a short flight.

These electrons are very small things. Their diameter has been estimated as $3{\cdot}7 \times 10^{-13}$ cm. They are very small even compared with the molecule of a gas. For example, the hydrogen molecule has been estimated to have a diameter of $2{\cdot}17 \times 10^{-8}$ cm. This is about 60,000 times larger than the diameter of an electron. Thus if a hydrogen molecule were magnified till its diameter were the length of a large Atlantic liner, the electron would have a diameter of about 1/10th of an inch—that is to say, about the size of a small rain-drop. It may be remembered that it has been said that if a drop of water were magnified to the size of the earth, a molecule would be about the size of a cricket ball; but such magnification would leave the electron only about 1/200th of a millimetre in diameter. It has been estimated that the number of free electrons in a cubic cm. of cold metal is about

10^{22}. From the surface of a tungsten filament heated to a temperature of 2,300° K., the number of electrons escaping from the square centimetre of area is $4{\cdot}3 \times 10^{19}$ which amounts to a current of 0·67 amperes. The emission from earthy oxides when heated is much greater than that from metals, and therefore lime-coated filaments are sometimes used in certain types of valve.

Suppose an electron placed in an electric field. Consisting, as it does, of negative electricity it will begin to move against the field—*i.e.*, towards the place of high potential, gradually gathering speed. The work done on it by the field during the motion from one point to another is equal to its charge multiplied by the difference of potential between the two points considered. This work appears as kinetic energy. If the mass of the electron is m, its charge e, its final speed u, and the potential difference V, they are connected by the equation,

$$\tfrac{1}{2}\, m\, u^2 = V\, e$$

supposing it to start from rest. Thus $u = \sqrt{(2\, v\, e/m)}$. The ratio e/m has been measured in many ways, and is known to be $1{\cdot}77 \times 10^7$ in electro-magnetic units and grams. Thus in rising through 1 volt the speed gained is 6,000 cm/sec., and in rising through 100 volts the speed amounts to 60,000 cm/sec., which is more than 1,300 miles per hour. It is convenient in thinking of the speeds of electrons to state the voltage that would correspond to the speed. For example, in valves used for generating oscillations the speeds will correspond to the 1,500 or more volts applied between anode and cathode. According to thermionic calculations the electrons escaping from the surface of a metal at a high temperature have an average speed corresponding to less than 1/20th of a volt.

In most thermionic valves the anode is a clean metal plate or cylinder placed at a distance of a centimetre or less from the glowing filamentary cathode. The electrons escaping from the hot cathode find themselves in the electric field established by the battery which is connected between anode and cathode, and they gather speed corresponding to this potential difference, whatever the distance between the places, by the time they reach the anode, which is a matter of 1/100,000 second. Most of them enter the anode and, it is thought, join the current that passes along the external wires, flowing, of course, in the direction opposite to the nominal direction of the current. Some are reflected at the anode, but if no other conductor is near are drawn back by the electric field. The current inside the tube thus equals that outside. The proportion reflected depends upon the velocity with which the ions strike, and on this velocity depends besides another phenomenon which has been investigated by A. W. Hull, and applied by him to a new method of using valves. He has shown that for certain velocities each electron may liberate three or four electrons from the metal, and that these are quickly pulled back to the anode by the field unless special means are taken to collect them. These electrons constitute the δ rays of J. J. Thomson, and they may become of practical importance later.

The pure electron discharge contemplated above requires examination. The cloud of flying particles exerts electric force and, in virtue of their motion, magnetic force also. The latter, it is found, may be disregarded in practical applications, but the electric force

has important consequences. It affects the potential gradient across the space between the two electrodes, with the result that the current is not proportional to the voltage as might as first sight be expected, but is proportional to the square root of the cube of the voltage. For the case of a straight filament of small radius along the axis of a cylindrical anode of radius a, Irving Langmuir has given the formula

$$i = 1310 \times \frac{V^{\frac{3}{2}}}{a}$$

for the current i. The potential distribution is shown diagramatically in Fig. 1. It is evident that if the filament is kept at a constant temperature, then at low voltages many electrons must return to the filament, and that as the voltage is increased there comes a time when all the electrons are caused to cross the vacuum. At higher voltages still, since the filament will not emit any more electrons per second at the present temperature, the current will not increase; the maximum value thus attained is called the saturation current at that temperature. This, and the effect of space charge, are shown by Fig. 2, from a paper by Langmuir.

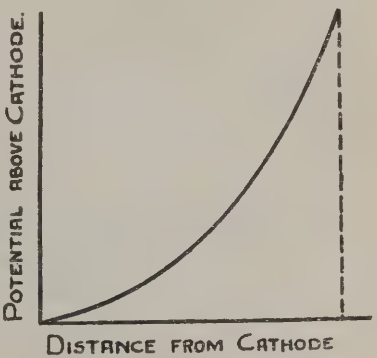

Fig. 1. Effect of space charge on Potential Gradient.

A tube such as this is a very perfect rectifier of alternating currents, for when an E.M.F. is applied to the terminals of such a tube half of the complete wave produces a considerable flow of current, while the other half of the E.M.F. wave produces no current, and therefore the result is a pulsating, undirectional current. It is in this manner that the Fleming valve operates when used instead of a crystal as a detector in wireless telegraph receiving circuits.

When the tube is to be used as an amplifier, however, the method at present in use consists in adapting a third electrode in such a manner as to influence the distribution of potential in the electron stream between anode and cathode, which in turn alters the value of the previously steady current through the tube. This third electrode may be outside the tube or inside, but it appears to be most efficient, in the case of the pure electron discharge, when arranged in the form of a grid between cathode and anode. The exact position has to be found by trial, and will perhaps depend in some degree upon the circuits in which the tube is to be used and the purposes to which it is to be applied. It seems evident, however, that in general the grid ought to be placed rather close to the cathode for the following reasons: The potential gradient is seen from Fig. 1 to be zero or very small at the cathode. In consequence, the flow of electrons in that region is scarcely accelerated at all by the field. By placing the grid in this region a very small change in its potential has a great proportional effect on the potential gradient, and therefore on the current flowing through the tube. This, of course, is precisely what is wanted in an

amplifier. Obviously the introduction of the grid is to some extent obstructive to the electron flow, but it is less so the finer the wires and the larger the spaces between them. The General Electric Company's designers, in developing the pliotron, of which sketches are

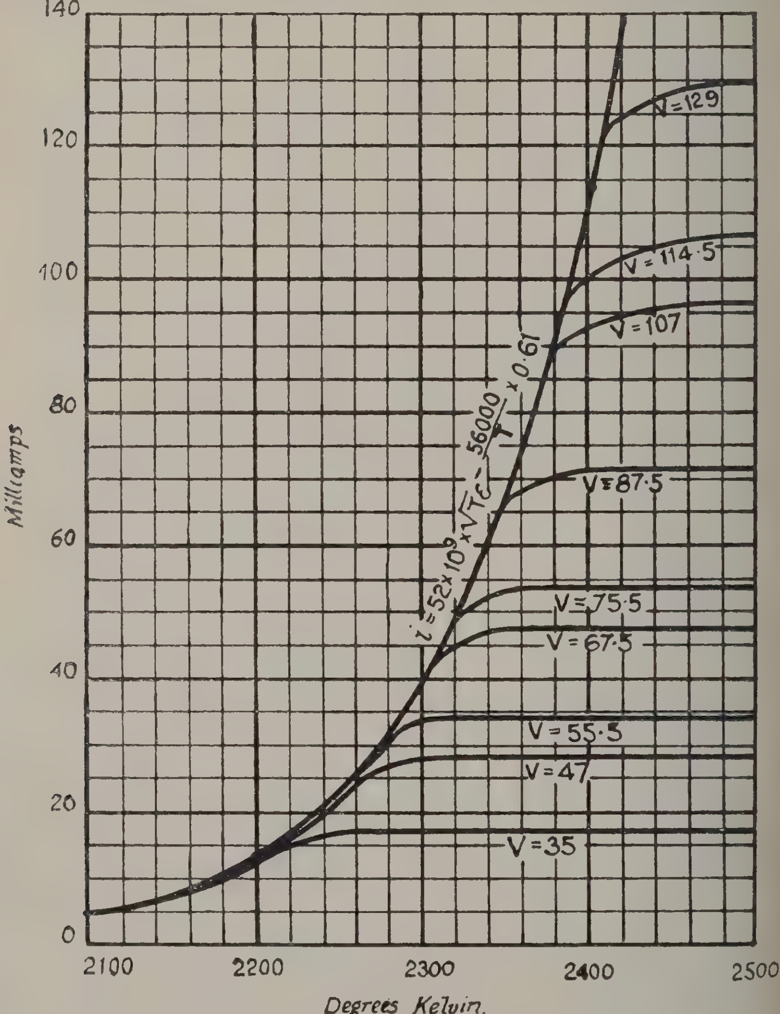

Fig. 2. The Thermionic Current between Cathode and Anode.

seen in Figs. 3 and 4, formed the grid by winding tungsten wire of 0.01 mm. or larger diameter on a glass frame with spaces of 0.01 mm. between the wires. The filament is V-shaped, and the anode is a pair of plates. In a valve of this type used for amplifying signals the voltage maintained between anode and cathode may be about

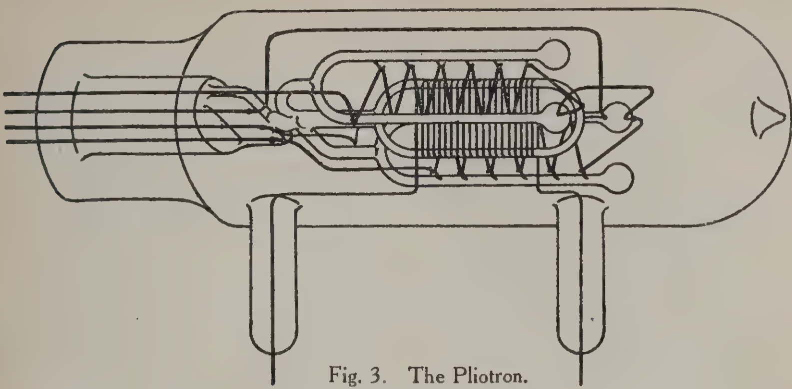

Fig. 3. The Pliotron.

200 volts. As a contrast to this, Figs. 5 and 6 show types of valve introduced by the Western Electric Company in which the grid, which ought not now to be called by that name, is not between the

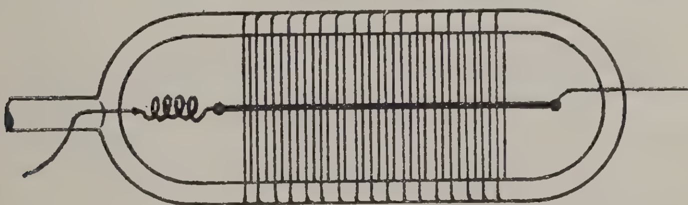

Fig. 4. Cathode and Grid.

cathode and anode. The glowing cathode is, in fact, a filament wrapped upon the electrode which acts as a grid.

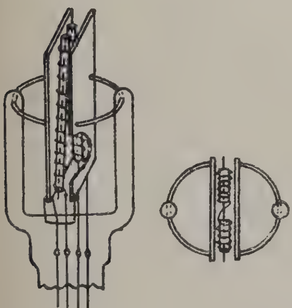

Fig. 5. Form of Audion.

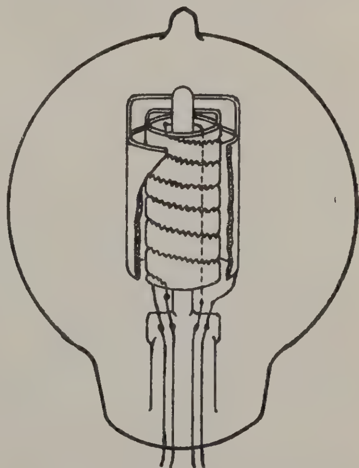

Fig. 6. Another form of Audion.

The explanation of the action of the third electrode may, in its essential features, be expanded as follows. First, it should be noted that the small or zero gradient of the potential which is produced near the filament by the space-charge opposes the anode voltage, and deprives the electrons of encouragement to leave the neighbourhood of the cathode—it is only their initial velocity of emission that carries them away; in fact, only the quicker ones will succeed in joining the main stream, the slower ones being returned again to the filament. Now, suppose the third electrode is near the filament in the region of small potential gradient; evidently if this electrode be raised in potential relative to the filament—*i.e.*, be given a positive charge, the potent al gradient is increased, more electrons can leave the neighbourhood of the filament, and the main stream is augmented. On the other hand, if the electrode be charged negatively, the gradient near the cathode will be diminished, may even be made negative, and therefore electrons will be driven back to the cathode and the main stream to the anode reduced. Since the third electrode in this manner controls the output of electrons from the cathode it may be called the control electrode, and its circuit the control circuit; and as the anode current reproduces the variations of the potential of the control electrode, the anode may be called the repeat electrode and its circuit the repeat circuit.

Tracing the above theory a little further, it will be seen that if the controller's potential be gradually raised till even the slowly emitted electrons can be dragged into the main stream by the electric field, there will come a time when all that can be emitted at the present temperature of the filament are drawn to the anode; when, in other words, saturation is reached. On the other hand, if the potential of the controller is reduced sufficiently, the bulk of the emission may be driven back to the cathode, and the anode current practically stopped. All these views are borne out to a considerable extent by the "characteristics" of a pliotron amplifier given in Fig. 7. The curves point out, however, that the above reasoning has not taken into account the fact that in altering the potential of the control electrode a certain amount of current must flow through that electrode.

It has been mentioned already that the pure electron discharge can be obtained only at extreme vacua and when the solid parts of the tubes are absolutely clean. In order to clean the solids, in the sense here intended, the filament and the other electrode are all heated simultaneously to incandescence and the glass of the bulb is raised to 500° or 600° during evacuation. At this temperature the glass may soften, so it is best to conduct the whole operation in a furnace that can itself be exhausted. In some valves all the electrodes are so designed that they can be heated by passing a current through them—for instance, in the pliotron the control electrode can be so heated. When Joulean heating is not convenient, as when the anode is a plate or cylinder, electron bombardment is employed; that is to say, a voltage is applied between the electrodes so as to drive a torrent of electrons on to the metal to be cleaned. In these ways all the molecules of gaseous or volatile substances that happen to be entangled with the surface molecules of the metals are liberated and taken away finally by the pump. To make sure that all the molecules likely to be liberated in the ordinary operation of the bulb are removed, it is necessary to

carry the heating or the bombardment beyond what is likely to happen in operation.

The presence of gas in a tube is not always a defect—indeed, it is often a necessary provision. For instance, one of the earliest and most successful valves, the Round valve, utilises a discharge that is

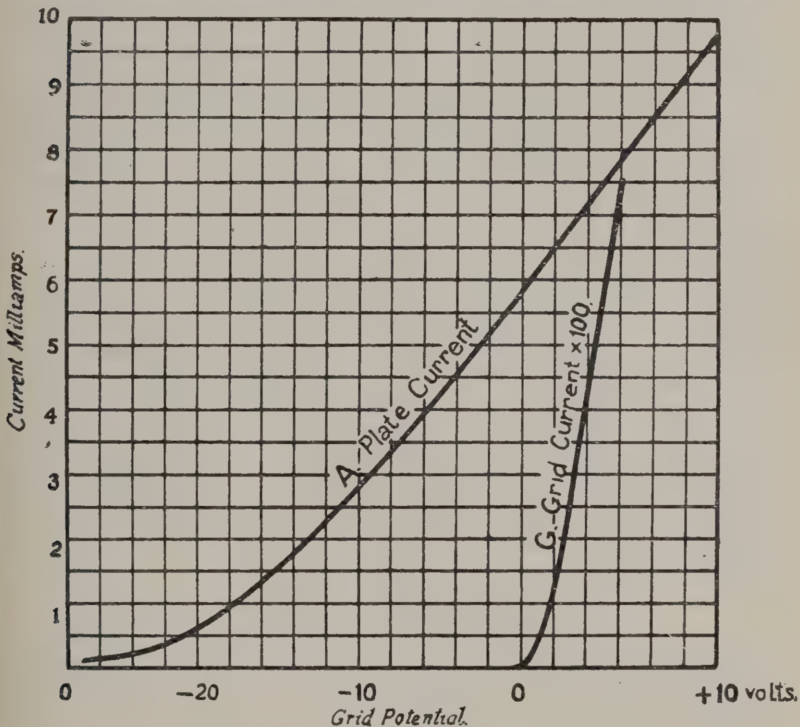

Fig. 7. Characteristic Curves of Plictron.

not purely electronic. Unfortunately the theory of the transit of electricity through such tubes has not yet been clearly developed, but we may glance at it at this point. The outstanding phenomenon in a tube containing molecules of gas flying about in the electron stream is that the electrons may eventually attain such speeds that when one collides with a molecule it knocks an electron out of it and so leaves it positively charged. The exhaustive experiments of Townsend have shown that the necessary velocity for all ordinary gases can be attained by the negative electron on rising between 8 to 20 volts. The bulk of the gas present in such tubes as the Round valve is doubtless mercury vapour. The next most likely gas appears to be hydrogen, since this is found in the adsorbed condition on all metal surfaces and on glass. The presence of gas in a high voltage tube is shown up by the glow that accompanies ionization by collision.

Now, the presence of positive ions has, it may be expected, the effect of making the current conveyed between anode and cathode

under a given voltage greater than the pure electron current, and for two reasons. In the first place, there are more electric carriers available for putting into motion; and, in the second place, the space-charge effect is neutralised by the presence of the positive ions. The former of these two reasons is a somewhat treacherous one, inasmuch as under certain circumstances the positive ions accumulate on the filament to form a positive layer through which the electrons cannot penetrate easily, and in this way the thermionic emission may be much reduced. This has been remarked upon a few paragraphs above.

Perhaps the most instructive account of the phenomena that occur in tubes containing no other gas than mercury vapour, and with this vapour at pressures such as may occur in the practical forms of bulbs, is that given by Richardson and Bazzoni. They measured the electron currents flowing under various P.D.'s from an incandescent tungsten filament to a cold anode of nickel wire. With small P.D.'s the currents follow the law enunciated above, as in extremely high vacua. Then, when the voltage across the tube is raised to about 20 volts, there is a violent rise of the current from, say, 100 microampères to 1,000 microampères. The actual proportional rise depends on the vapour pressure being small at very low or at very high pressures. The larger current can be maintained with a few volts less than that needed to start the augmented current. Whether or not there is any visible glow in this highly conducting state depends on the pressure of the mercury vapour in the tube; if the vapour pressure is greater than 0.001 mm. there is always visible glow, but otherwise there is not. On the other hand, a strong emission of ultra violet light always accompanies the sudden rise of current. These phenomena do not happen if the filament is run at a rather low temperature; in this case a saturation value of the current is quietly attained.

CIRCUITS USED WITH VALVES.

Valve as Generator of Oscillations.

It is convenient to discuss first the methods of using the valve as a generator of oscillations, because it is often so used in receiving

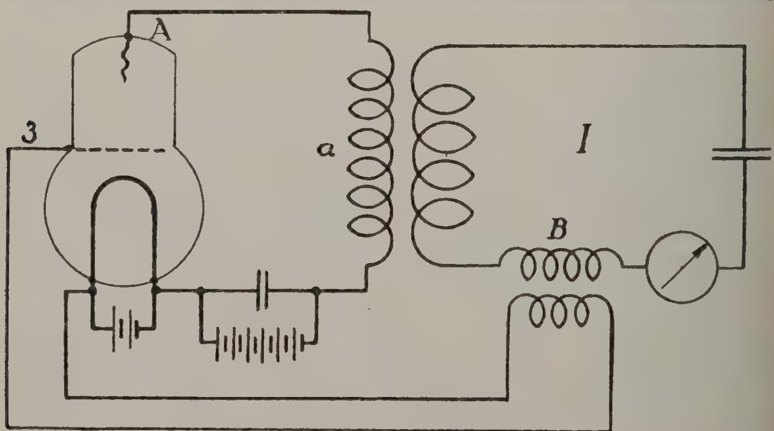

Fig. 8. Meissner's Circuit for Oscillating Valve.

apparatus as well as in sending apparatus. The principle relied upon is really an old one, but its application in the present instance is a peculiarly happy and beautiful one. It appears to have been made first by A. Meissner. The circuits given by Meissner are shown in Fig. 8. A simpler-looking circuit is seen in Fig. 9. In order to understand its mode of action, imagine that an oscillatory current is already running in the LC circuit of Fig. 9. It could be kept going if a fillip could be given it in every swing at about the right instant, just as a clock pendulum or a watch balance wheel is kept going by pressures exerted by the escapement. The battery E could give these fillips by passing properly timed discharges round the circuit formed by EAF with L and C in parallel. The control electrode does the timing, for in its coil L^1 an alternating e.m.f. is induced by the oscillatory current in L^1, and this

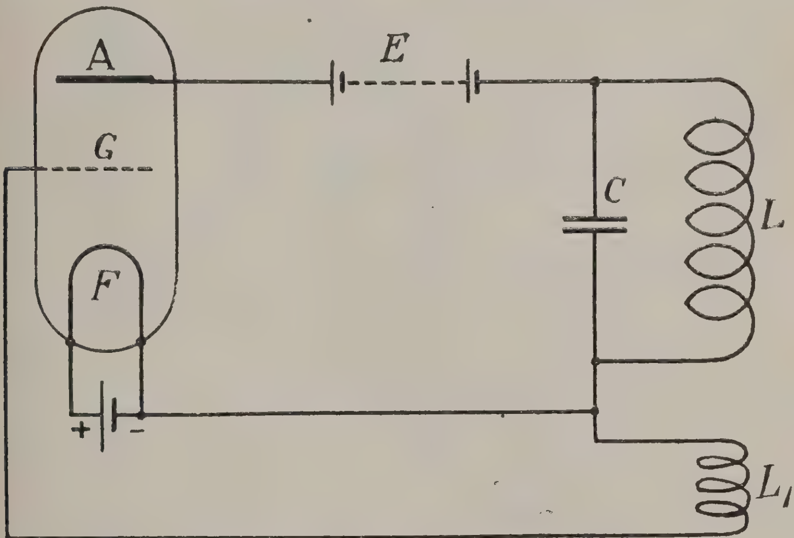

Fig. 9. Circuit for Oscillating Valve

alternating e.m.f. charges G positively at a definite instant of every cycle, which in turn prompts a larger flow of current round the repeat circuit. It is this larger flow that gives the required fillip to the oscillating circuit. To make an analogy with the steam engine, E is the boiler, electricity takes the place of steam, G is the slide valve, the mutual induction between L and L^1 corresponds to the eccentric, and—this is where the analogy is defective—L and C correspond to a combination of piston and a sort of oscillatory flywheel. Of course, for continued operation it is necessary that the power consumed in operating the control circuit should be less than that supplied by E to the oscillatory circuit. That this is easily accomplished will be well understood from what has been written above.

This mode of action of the self-regulated valve has not yet received a good name. Some call it the "Reaction method." A truer name is "Retroactive method," but it is a rather cumbrous term. Some writers

have called it the " Kick-back method," and others still the " Regenerative method."

According to statements made by those developing valves for the purposes of C.W. sending, large bulbs can be made to give an output of a kilowatt. This is accomplished by using tungsten filaments of large surface area driven at high temperature, so as to supply a copious emission of electrons, and using voltages of several thousand volts at E in Fig. 9.

Modifications of the above circuits are frequently employed. For example, W. C. White, of the General Electric Company of America, has recently described two rather extreme types of circuit, specially designed for generating extreme frequencies. These are shown in Fig. 10 and Fig. 11. In the former Fig. retroaction takes place through

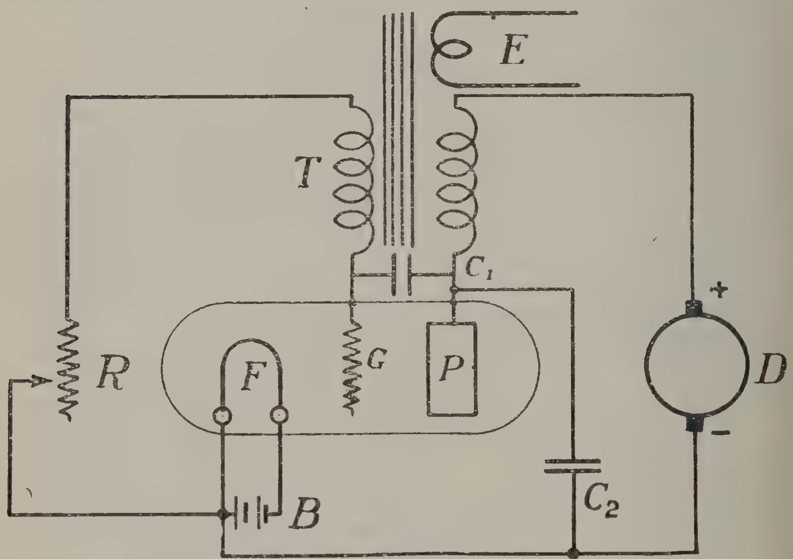

Fig. 10. Low Frequency Circuit.

the transformer T and a condenser C_1 jointly. The transformer is provided with an iron core, these being low-frequency circuits. The capacity C_2 is perhaps 25 microfarads and the inductance in circuit may be 100 henrys. The coil E enables energy to be drawn from the circuit in the form of alternating current, while D is a direct-current dynamo from which all the energy is ultimately derived. It has been possible to generate alternating current of frequency one-half cycle per second. For measurement of the current at this frequency, central zero, direct current ammeters were used, and thus the oscillations could be seen and studied. By introducing resistance at R the amplitude of the oscillations could be reduced and finally oscillation could be made impossible. A critical value of R could be arranged so that oscillation once started dies down very slowly. This point has an important bearing on Franklin's method of arranging receiving circuits, described later.

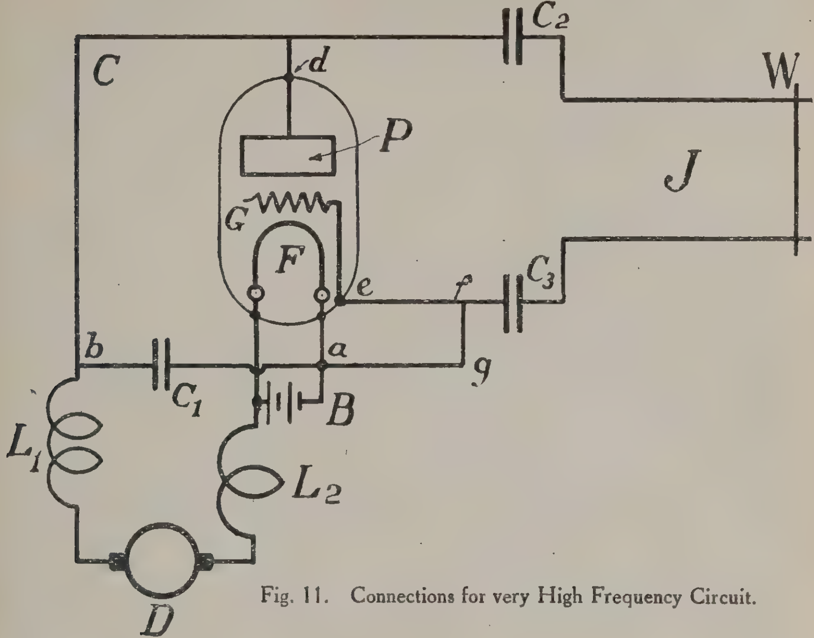

Fig. 11. Connections for very High Frequency Circuit.

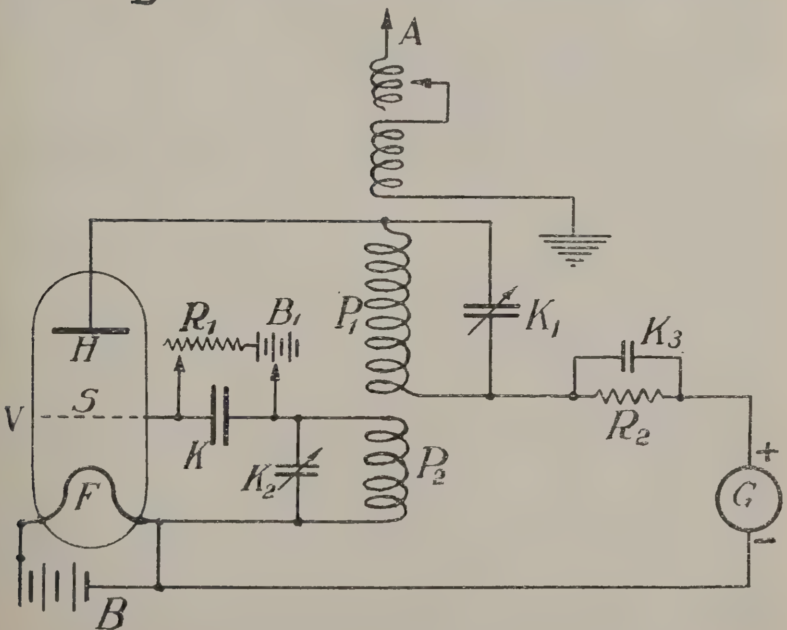

Fig. 12. Round's Circuit for Oscillating Valve.

Fig. 11 shows arrangements for producing oscillations of extremely high frequency. In this the oscillating circuit is tuned by moving the slider W along the parallel wires J so as to include more or less wire in the circuit. The oscillating inductance in the repeat circuit consists solely of the connecting wires *b*, *c*, *d*, and in the control circuit of *e*, *f*, *g*, *a*, each of these wires being only a few inches long. The oscillating circuit is coupled to the valve circuits by very small condensers C_2, C_3. The dynamo is protected by choking coils L_1, L_2. Waves of frequency 50 million per second—*i.e.*, of wave-length 6 metres—have been produced by this apparatus.

From the last apparatus it will be gathered that there is a great variety of ways of establishing retroaction. In fact, when circuits become complicated through elaboration for some special purpose the difficulty may arise of preventing oscillations, and the unwanted vibration may be very embarrassing. In some types of valve the capacity between the repeat and the control electrodes inside the tube is sufficient coupling to ensure retroaction and sustained vibration.

The arrangement in Fig. 12, which is due to H. J. Round, is of interest in many respects. In the first place, it is intended for use with valves that are much softer than those employed in the circuits last described. In the second place both the control and the repeat circuits contain oscillating fly-wheel circuits ; these are marked P_2 K_2, P_1 K_1. In the third place, there is an electromotive force applied to the grid, and this is adjusted by aid of resistance R_1 to obtain the optimum arrangement. It is said that the resistance R_1 associated battery B_1 shunted by the condenser K_2 has the object of ensuring the stability of the tube. The resistance R_2 also requires adjustment and is usually used with a value about double that necessary to allow an arc to start in the bulb. These circuits are used in wireless telephony.

VALVE CIRCUITS FOR RECEIVING.

On surveying the very numerous forms of receiving circuits of which descriptions have been published, we find at least four distinct

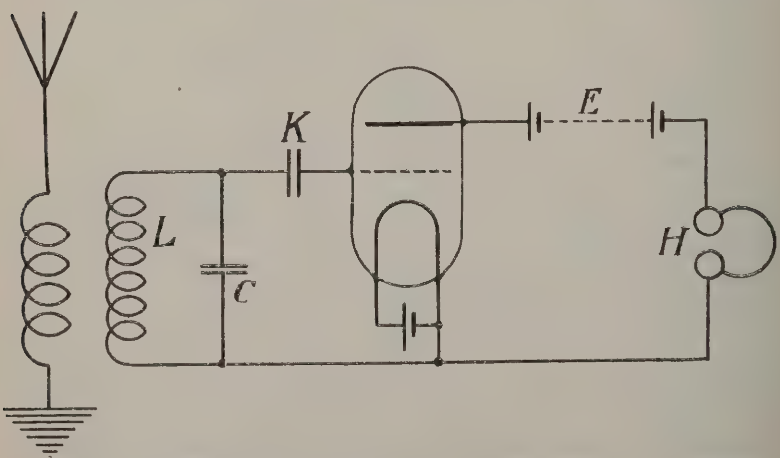

Fig. 13. Valve used as Detector. E is a High Voltage Battery. H Telephones.

methods which are combined in many ways. It is convenient to consider these methods independently. They are separated as follows: First, the valve may be used as a mere detector; second, it may be used as a magnifier; third, it may be adjusted so near the oscillating point that any oscillation once started in the circuits dies down very slowly; fourth, the circuits may be sustained in oscillation by the valve, and reception accomplished by beats. We will take these four types in turn

USE OF VALVE AS DETECTOR.

The circuits of one method are shown in Fig. 13. The mode of operation is as follows: When oscillations are induced from the aerial in the closed circuit containing L and C, oscillatory potential differences arise between the grid and the filament, which leads, on account of the rectifying action of the tube, to a negative charge accumulating on the right-hand plate of condenser K. A single train of waves, therefore, produces a definite fall of potential of the control electrode, and this in turn causes a fall in the telephone current traversing the repeat circuit—that is to say, a single train of waves makes a click in the telephone. If the tube is fairly soft the condenser charge will practically all leak away before the next train arrives; but if it is hard a resistance must be connected in shunt with the condenser to provide a leakage path. The process is illustrated diagrammatically in Fig. 14, which explains itself, and which is copied from a paper by E. H. Armstrong, published by the Institute of Radio Engineers. This method of using the valve is not an advantageous one; a crystal detector usually gives a better performance. It may be mentioned in passing that it is not good practice to have the telephone in the high voltage battery circuit; a transformer should be used to part the telephone and battery.

The condenser K may be omitted with certain kinds of tube. W. C. White has shown that a minute trace of certain gases cause in the characteristic curve of the pliotron a variation of such a kind that near a very definite grid voltage the repeat current decreases whether the control voltage is raised or lowered a slight amount. Oscillations in the control voltage, therefore, cause a fall in the telephone current.

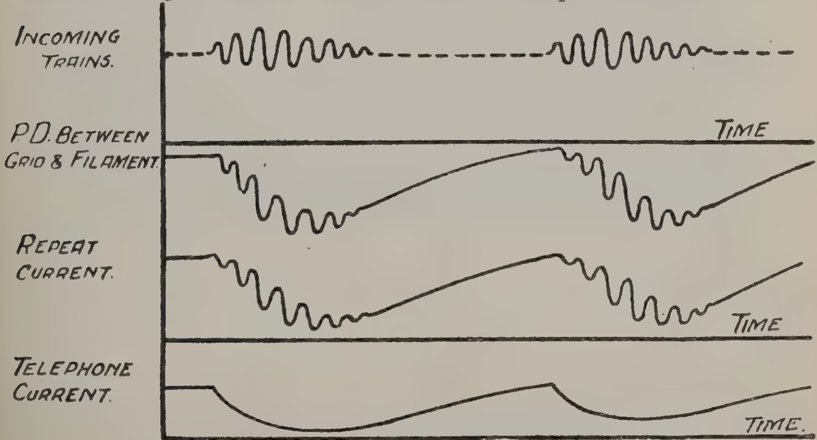

Fig. 14 Diagram showing operation of Valve used as Detector.

Use of Valve as Amplifier.

There are two very obvious possibilities—either the low frequency vibrations of the telephone and detector circuit may be magnified or the high frequency oscillations may be magnified before being passed to the detector. In each case the current to be amplified is so arranged as to cause variations of the potential difference between the control electrode and the filament, and the consequent magnified current variations in the repeat circuit are utilised.

With the softer varieties of tubes, such as the Round Valve, and with skilful manipulation, magnification of current amplitudes amounting to more than ten times can be attained. With hard tubes magnification of four or five times is easily attained. If magnification is measured in energy values the above numbers should be squared.

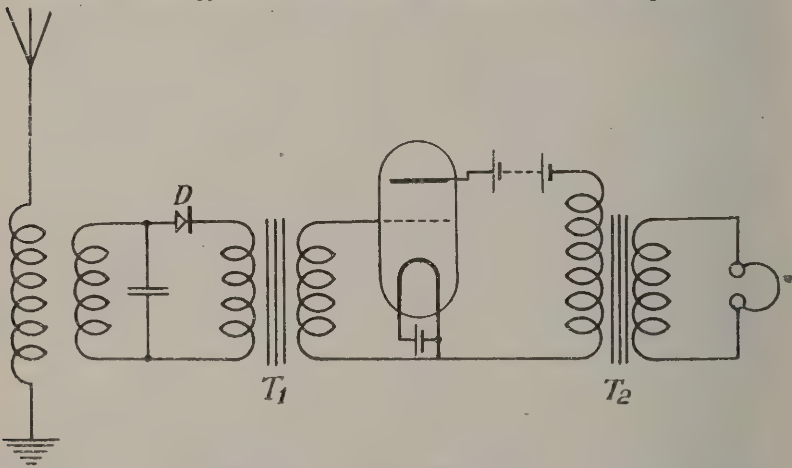

Fig 15. Audio Magnification. T_1 and T_2 are Iron Core Transformers.

Fig. 15 gives a simple arrangement for audio magnification in damped wave reception; Fig. 16 a simple arrangement for radio amplification. These will be seen to be very direct applications of the theory of the valve as described on preceding pages. Of course, these two functions can both be exercised in turn in the same receiving apparatus; this is shown in Fig. 17. It is possible, too, to arrange for several valves to be used in cascade for increasing both the radio amplification and the audio amplification. Fig. 18 shows circuits in which one valve is giving both audio and radio magnification simultaneously.

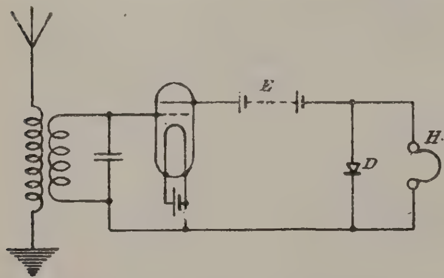

Fig 16. Radio Magnification. (The Detector D may have a Potential Divider associated with it to increase its sensitiveness.)

THE RT. HON. A. H. ILLINGWORTH, BRITISH POSTMASTER-GENERAL.

(*For whose Biographical Notice see page* 884.)

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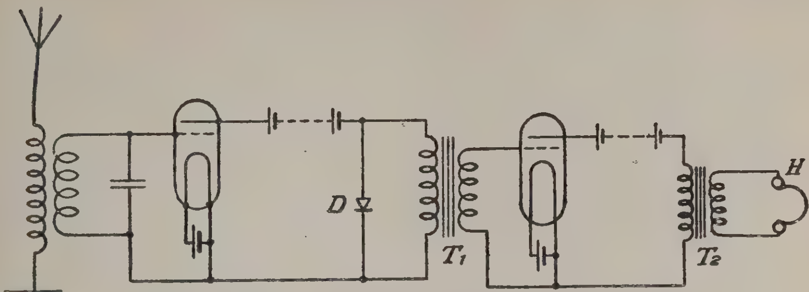


Fig. 17. Radio and Audio Magnification by tubes in cascade. T_1, T_2 are Iron Core Transformers.

USE OF VALVE FOR INCREMENTING A CIRCUIT.

Very early in the history of the three-electrode valve, C. S. Franklin conceived the idea of using a valve in such adjustment that it barely failed to keep the circuit oscillating. It stands ready, so to speak, to help an incoming train of waves to start the receiving circuit into oscillation, and it endeavours to sustain an oscillation once started, but it just fails to sustain it. In this way a large

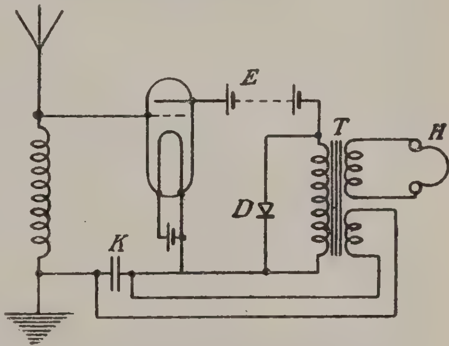


Fig. 18. Radio and Audio Magnification with a Double Secondary.

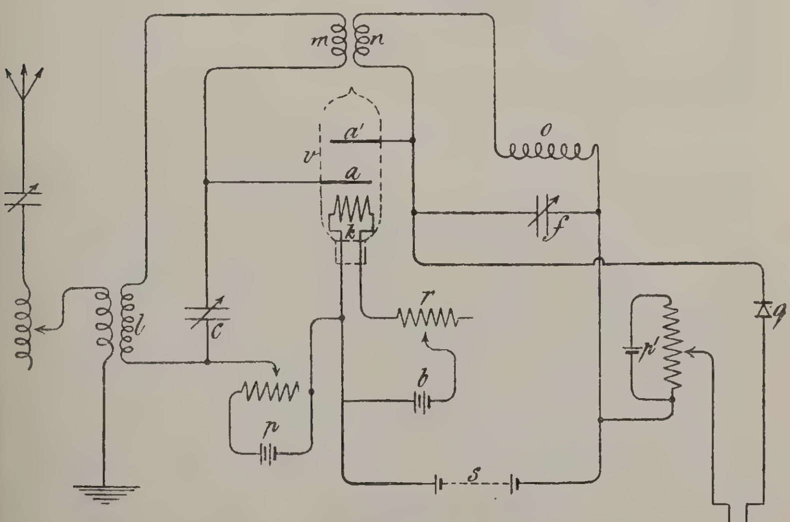


Fig 19. Franklin's method of Incrementing.

amount of energy is added to that brought by the incoming train of waves, energy that is derived, of course, from the direct current supply in the anode circuit. The total consisting of the energy from the train plus the energy from the valve battery is then passed to the detector and produces a response many times greater than the unassisted wave train. The circuit is thus not merely without decrement, it is a circuit with negative decrement—*i.e.*, with an increment. The circuit is more than undamped, it is underdamped.

A diagram of a receiving circuit designed by Franklin is seen in Fig. 19. The antenna is seen coupled through the coil *l* to a circuit *l*, *m*, *e* tuned to it; this is coupled at *m*, *n* to another tuned circuit *n*, *o*, *f*. These two closed circuits are arranged for oscillation by the valve, in which *k* is the cathode, *a* the control electrode, a^1 the anode. By altering the coupling between *m* and *n* the system can be adjusted so as just not to oscillate. The circuit *n*, *o*, *f* is connected in the customary

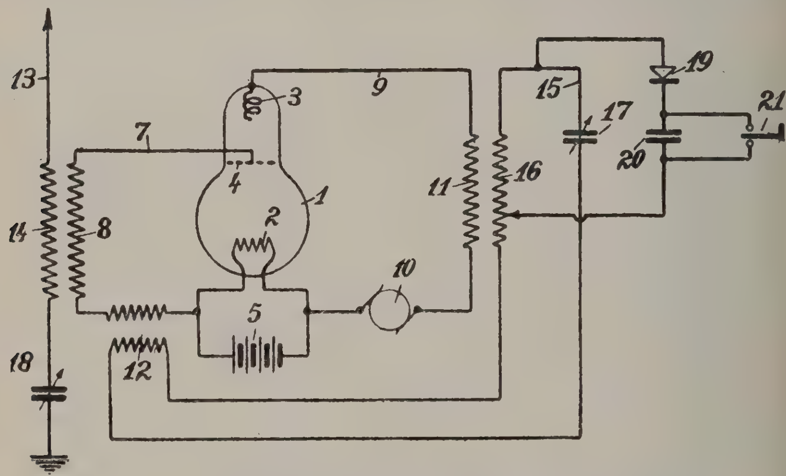


Fig. 20. Arco and Meissner's Amplifying Receiving Circuit.

manner to a crystal detector *q*, which is in series with a potential divider *p* and a telephone *t*; *p* is a small battery bringing the control electrode to a definite potential above the cathode; *b* is the filament heating battery; and *s* is the high voltage anode battery. When the antenna is disturbed by a train of waves the system set into oscillation and dies slowly down again while all the time the crystal is rectifying the alternating current passed to it.

There is shown in Fig. 20 a scheme of circuits due to Arco and Meissner. The circuit 16, 17, is the usual closed circuit of ordinary wireless telegraphy with the associated detector circuit 19, 20, and telephone 21. Coupled to this closed oscillatory circuit is the control circuit 7 and also a repeat circuit 9 of a valve 1. The e.m.f. applied through transformer 8 to the grid 4 produces an enlarged anode current which by means of transformer 12 strengthens the initial oscillation in 16, 17. Thus an amplified oscillation is built up at the expense of the generator 10 and only dies away when the wave train ceases.

USE OF VALVE IN BEAT RECEPTION.

This mode of receiving, which is sometimes called the heterodyne method, consists in arranging that the oscillations produced by signal bearing waves shall produce with locally generated oscillations of about the same intensity the variations in amplitude called beats, these beats being of audible frequency. Now two distinct vibrations occurring simultaneously in the same circuits produce beats only when there is a difference in their frequency, and the number of beats per second is equal to the difference between the frequencies Thus it is only necessary in applying the valve to this method of reception to arrange that it shall produce in the receiving circuit an uninterrupted supply of oscillatory energy of adjustable frequency. The frequency in this locally generated energy may be either greater or smaller than that of the incoming waves by the number representing the frequency of the audible note which is desired in the telephone. Since the valve will start the receiving circuit oscillating in the natural frequency of that circuit it follows that this circuit is necessarily out of tune with the incoming waves, but this may be relatively a small matter, and, in fact, excellent work can be done without paying any attention to the mistuning.

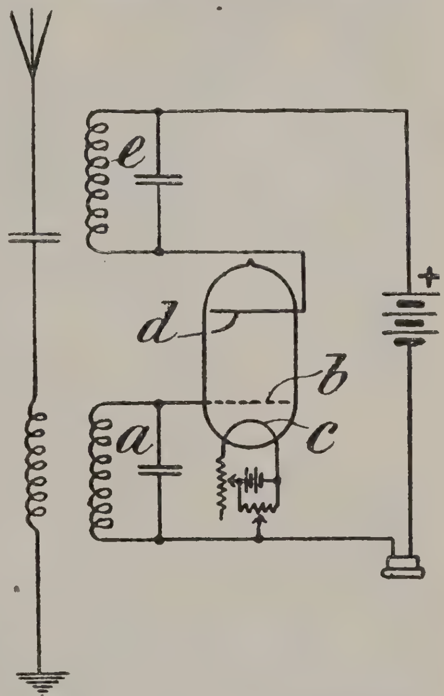


Fig. 21. Round's Circuit for Beat Reception.

Many kinds of circuit have been designed for carrying out this method. Fig. 21 is due to H. J. Round. The circuit *a* is tuned to the antenna and to the signals, and since it is connected with the grid *b* it produces oscillations in circuit *e*, which is of slightly different natural frequency. At the same time oscillations of the frequency only of circuit *e* are generated by retroaction through the coupling between *e* and *a*, the energy being supplied from the battery in series with the telephone. Usually a condenser would be connected across the telephone to pass the oscillations unless the accidental capacitance of the telephone leads is satisfactory. Beats are produced between the two oscillatory currents, and if the resulting pulsating current is of sufficiently low frequency it will pass through the telephone and produce an audible sound.

A circuit due to L. de Forest is shown in Fig. 22, which is copied from an interesting paper by L. W. Austin published in the Proceedings

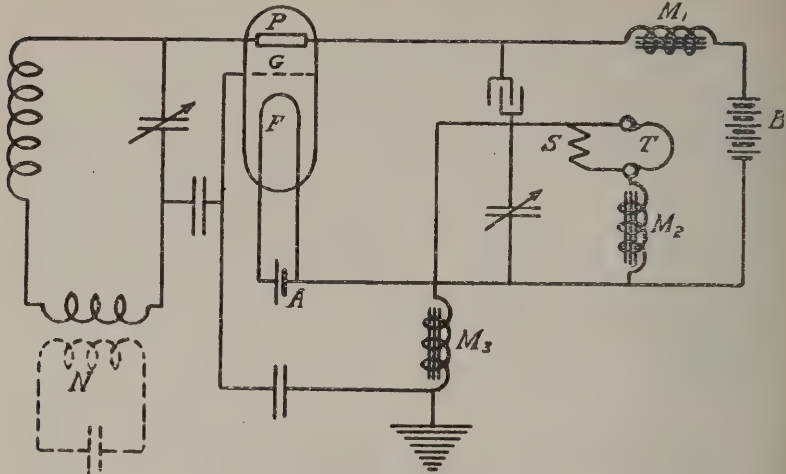


Fig. 22. L. de Forest's Ultraudion Circuit (S is a shunt for signal measurement).

of the Institute of Radio Engineers. According to E. H. Armstrong the explanation of the action of this circuit is brought into line with the ordinary theory by redrawing the diagram as shown in Fig. 23. This latter figure shows that the repeat circuit is coupled with the control circuit by the condenser *C*. L. de Forest calls the arrangement of Fig. 22 the ultraudion circuit. The additional circuit shown in dotted lines is an improvement due to Austin, who calls it the sensitising circuit and shows that it increases the sensitiveness some three or four times. Armstrong explains the action of this circuit by pointing out that its effect is to give to the receiving circuits two natural frequencies, which are adjustable by variation of the coupling. One of these frequencies is made equal to that of the incoming signals and the other beats with it.

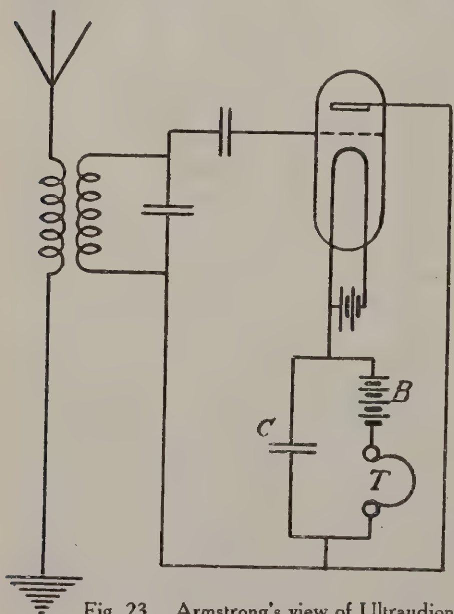


Fig. 23. Armstrong's view of Ultraudion.

Combinations of the Above Circuits.

The methods of combining in receiving apparatus the four typical methods now described are legion, and it would be impossible to treat

even the more successful modifications at all fully in the space of the article; the following example must suffice.

A design due to Arco and Meissner is seen in Fig. 24. The antenna 13 is coupled to the secondary circuit 31, which is slightly out of tune with it. The forced oscillations in 31 are amplified, because transformer 30, 8 is connected to the control electrode and 40 is in the repeat circuit. Now suppose that the coupling between 30 and 8 is close enough to enable the valve to generate continuous oscillations in the circuits of the period natural to the closed circuit and therefore different from that of the incoming waves. Beats are now produced in every part of the circuits where both oscillatory currents are running, and a pulsating current of the beat frequency flows through the tube from the anode 3. Let now telephone transformer 26, 27, with telephone 21, be tuned as a whole by aid of condenser 28 to a frequency slightly different from that of the beat, then a musical note is produced permanently in the telephone, and this note will beat in turn with the beat note first mentioned. The designers of the method say that the variations in the permanent sound caused by this second beating, which rises, it should be noted, only when signal waves arrive, give a very sensitive method for receiving either damped or undamped signals.

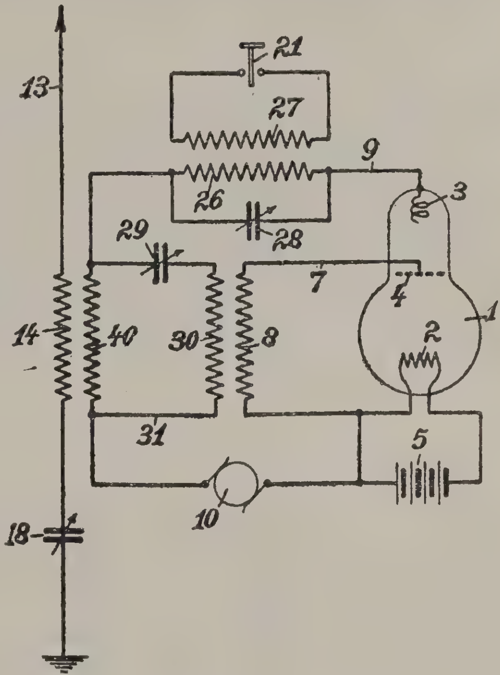


Fig. 24. Arco and Meissner's Combined Circuits.

THE INDUCTANCE, CAPACITY AND NATURAL FREQUENCY OF AERIALS

By Professor G. W. O. Howe, D.Sc., M.I.E.E.

An aerial may be regarded from two different standpoints; from one it is an oscillatory circuit, from the other an open transmission line. An inductive coil with an air-condenser connected across its terminals constitutes an oscillatory circuit with a natural frequency of $1/(2\pi\sqrt{LC})$, which can be increased by decreasing either the inductance or the capacity. Such a circuit is shown in Fig. 1 (*a*), whilst in Fig. 1 (*b*) the capacity is reduced by increasing the distance between the plates; in Fig. 1 (*c*) the earth replaces the lower plate of the condenser, and in Fig. 1 (*d*) the capacity is still further decreased by elevating the upper plate or replacing it by a vertical wire. The frequency can be further increased by decreasing the inductance, until in Fig. 1 (*e*) it is merely

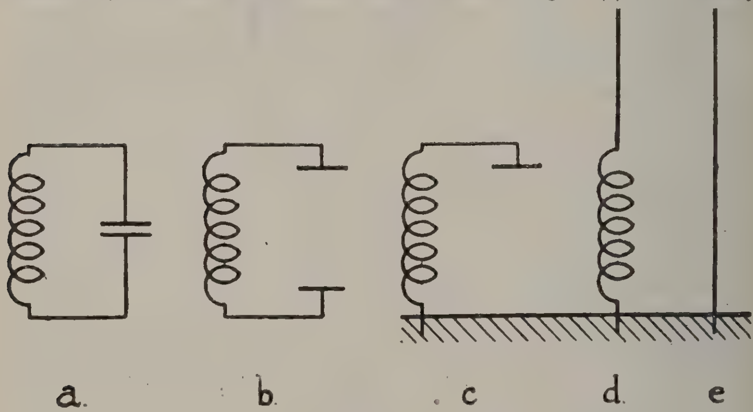


Fig. 1

that of the lower part of the straight vertical wire, the upper part of which serves as the upper plate of the condenser, one function gradually increasing and the other decreasing as one passes up the wire. This is not so in Fig. 1 (*d*), where the inductance of the straight wire may be negligible compared with that of the coil at the base of the aerial.

Viewed from the other standpoint the aerial is an open transmission line, and this is the more accurate and instructive point of view. Fig. 2 represents two parallel wires open at the right-hand end and connected to the terminals of an alternator at the sending end. Neglecting losses, the alternator can have no output once the steady state has been established. The electromagnetic waves arriving at the open end are reflected, and, interfering with the forward waves, set up a system of stationary waves. There are points P_1, P_3, P_5, etc., where the P.D. is always zero, and other points, P_0, P_2, P_4, etc., where the current is

always zero. At the moment of maximum P.D. at the end, the P.D. at every point of the line has its maximum value, although this maximum varies from point to point as shown in Fig. 2. At this moment the current is everywhere zero, but a quarter-cycle later the current will have its maximum distribution as shown in the lower diagram, whilst the P.D. will be zero. The medium being air, the velocity of the waves is 300,000 kms. per second and the wave-length $\lambda = 300,000/f$ kms. where f is the frequency of the alternator. The length of the line has not yet been discussed; if its left-hand extremity be P_1, P_3, or P_5, the alternator being connected at one of these points, its terminal P.D. will be zero, no matter what the current and P.D. may be at other parts of the line. If, then, the frequency and the length of the line are so related that the latter is equal to any odd number of quarter wave-lengths, the line can be short-circuited at the sending end and the alternator removed without affecting the oscillations. Were it not for unavoidable losses the oscillations would persist indefinitely; as a matter of fact, resistance, leakage and radiation cause the energy to be dissipated and the oscillation consequently to be damped out.

The frequency of the alternator can be adjusted or tuned until $l = \lambda/4$ or $3\lambda/4$, or any odd multiple of $\lambda/4$—that is, it can be tuned to the fundamental or any odd harmonic of the given line. By tuning we here mean the adjustment of frequency until the impedance of the load —*i.e.*, of the line—is a minimum. The impedance is the ratio of the P.D. to the current, and were it not for the losses in the line, it could be reduced to zero. Since the line is capable of oscillating at all these various multiple frequencies after the source of E.M.F. is removed, it is obvious that such a line has an infinite number of natural frequencies, and if precharged to a uniform potential and then suddenly discharged it will oscillate in a complex manner, due to the superposition of the fundamental and the harmonics into which the initial distribution could be analysed by means of Fourier's theorem. In what follows the fundamental only is considered unless otherwise stated, so that the only node of P.D. is at the origin.

If the distance between the lines is not very small compared with the quarter-wave length some indefiniteness arises as to what should be considered the length of the line, because, although the copper wire stops abruptly, the electric and magnetic fields do not do so, but spread out to some extent beyond, just as in an open organ pipe a small addition has to be made to the actual length to allow for the compression and rarefactions extending somewhat into the outer air beyond the limits of the pipe. To obtain resonance, therefore, the frequency of the alternator must be adjusted to a wave-length somewhat greater than four times the length of the actual line.

It is obvious that the two lines of Fig. 2 could be replaced by a single line with an earth return. What will happen now if the single line, instead of running horizontally, is placed vertically ? Before considering this it is well to modify the line of Fig. 2, so that it transmits symmetrically in every radial horizontal direction, and not simply in one direction. This can be done by making the upper conductor an inverted metallic cone with its apex almost touching the ground, as shown in Fig. 3. If the alternator is connected between the apex and the ground, currents will flow just as in Fig. 2, but radially in every direction, the magnetic field will flow concentrically in the space

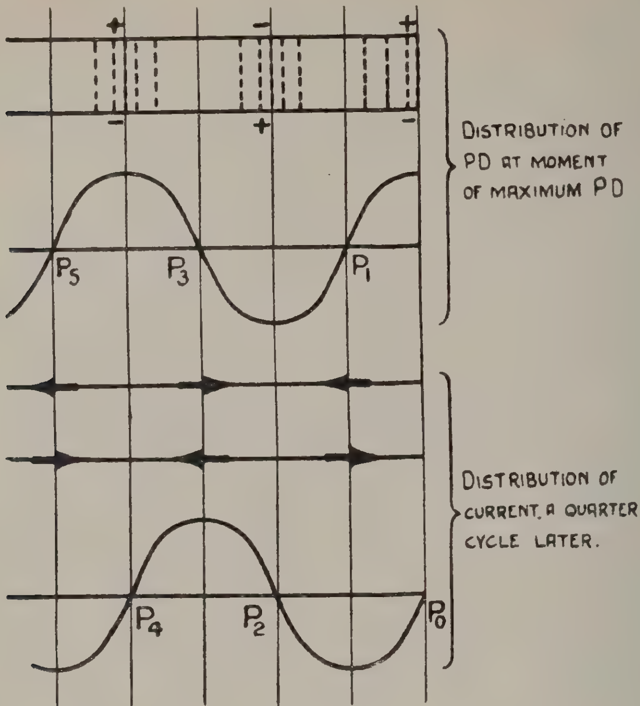


Fig. 2

between the cone and the earth, whilst the electric field will pass between the cone and the ground, as shown in the figure. By assuming the upper conductor to be a cone rather than a disc, one obtains a transmission line—if we may still so call it—in which the inductance and capacity per unit length of line are constant, as in the case of two parallel wires. As the distance from the generator increases, the greater cross-sectional areas available for the magnetic and electric fields are exactly counterbalanced by the greater lengths of their paths.

By making the cone more and more acute it approximates finally to a vertical wire. If one neglects the end effect referred to above and

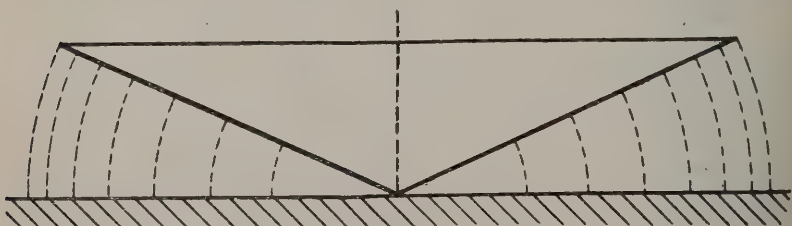


Fig. 3

assumes that the electric field follows circular paths as shown in Fig. 4, the capacity C per unit length can be calculated very simply—it is :

$$C = \frac{1}{2 \log_\epsilon \frac{h}{r}} \cdot \frac{1}{9 \times 10^{11}} \text{ farads per cm.}$$

where h is the height and r the radius of the wire, which is taken to be that of the cone at half the height. Since the velocity v of electromagnetic waves is 3×10^{10} cms. per second and $v = 1/\sqrt{(LC)}$:

$$L = 2 \log_\epsilon \frac{h}{r} \cdot 10^{-9} \text{ henries per cm.}$$

These values of the capacity and inductance per unit length agree exactly with those of an infinitely long wire of the same diameter placed horizontally at a distance of $h/2$ above the ground, and one can therefore assume that the effective values per unit length of any

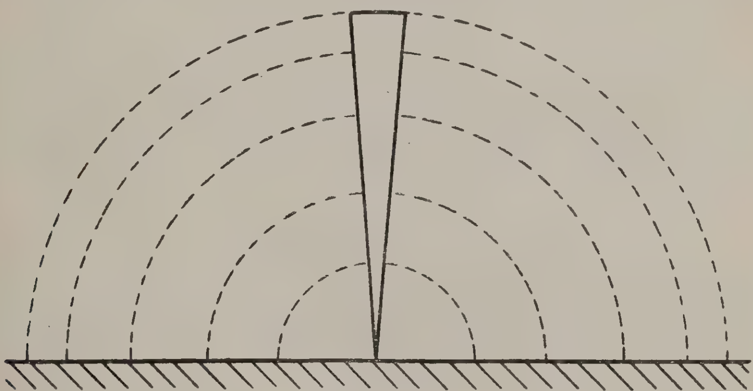


Fig. 4

arrangement of vertical wires are approximately the same as if the wires were infinitely long and placed horizontally at half the total height.

Were it not for the end-effect mentioned above, the natural fundamental wave-length of such a vertical wire, connected at its lower end to a perfectly conducting earth, would be exactly four times its height. It has been calculated that the actual wave-length is 4.2 times the height—that is, the end-effect causes an increase of 5 per cent. An accurate experimental determination is difficult owing to the imperfect conductivity of the earth.

In applying transmission line formulæ it must be remembered that the inductance and capacity per unit length refer to this length as a part of an infinitely long line. For this reason one is justified, when calculating the capacity of unit length of the vertical wire in Fig. 4, in assuming that the electric field of this portion is confined within a spherical shell of unit radial thickness. Similarly, when calculating the capacity per unit length of an overhead telephone line, one assumes that the electric field lies between two planes normal to the direction of the

wires and unit distance apart. With the vertical wire the interval which elapses between the moment of no P.D. and of maximum P.D, is only long enough for an electromagnetic disturbance to reach a distance of $h=\frac{\lambda}{4}$ from the foot of the aerial (neglecting the 5 per cent. end-correction), so that the spherical path of the electric field assumed in Fig. 4 will probably approximate very closely to the actual facts.

Let us consider now the effect of inserting an inductance L_x between the aerial and earth. The apparent impedance at the sending end of a line open at the far end is equal to :

$$\sqrt{\left(\frac{Z}{Y}\right)}\frac{\cosh al}{\sinh al}$$

where Z is the impedance and Y the admittance per unit length of the line, and $a=\sqrt{(ZY)}$. In our case we neglect resistance and leakage, so that the impedance is simply $j\omega L$, and the admittance $j\omega C$, where $\omega=2\pi f$. The apparent impedance of the plain aerial alone is therefore

$$\sqrt{\frac{L}{C}}\cdot\frac{1}{j\tan\omega l\sqrt{LC}}$$

which vanishes when ω is adjusted to make $\lambda=4l$ since $\omega l\sqrt{(LC)}$ is then $\pi/2$. If, however, the inductance L_x is inserted, its impedance—viz., $j\omega L_x$—must be added to that of the vertical wire, and, in order to tune the whole aerial, its joint impedance must be reduced to zero. Therefore

$$L_x=\frac{1}{\omega}\sqrt{\frac{L}{C}}\cdot\frac{1}{\tan\omega l\sqrt{(LC)}}.$$

If the fundamental frequency of the aerial was originally $f_0=\omega_0/2\pi$, corresponding to a wave-length λ_0, let the new natural frequency be $f=\alpha f_0$ and $\lambda=\lambda_0/\alpha$ where α will be a fraction; then since $\omega_0 l\sqrt{(LC)}=\pi/2$,

$$L_x=\frac{1}{\omega_0}\sqrt{\frac{L}{C}}\frac{1}{\alpha\tan\alpha\pi/2}.$$

Substituting the values just found for L and C for a plain vertical wire, and putting $\lambda_0=4h$, this becomes

$$L_x=12\cdot76\,h\log_\epsilon\frac{h}{r}\cdot\frac{1}{\alpha\tan\alpha\pi/2}\,10^{-10}\text{ henries.}$$

For example, to double the fundamental wave-length of a wire 2 mm. radius and 100 feet high,

$$L_x=12\cdot76\times3050\times\log_\epsilon\frac{3050}{0\cdot2}\cdot\times2\times10^{-10}\text{ henries.}$$
$$=75\text{ microhenries.}$$

If the added inductance is very small, $\delta=1-\alpha$ will also be very small, and the formula for L_x becomes

$$L_x=\frac{\pi\delta}{2\omega_0}\sqrt{\frac{L}{C}}.$$

In an ordinary oscillatory circuit with concentrated capacity and inductance, the latter, L_0, can be determined experimentally by

adding a known inductance L_x and noting the change in the natural frequency of the circuit. Since the capacity is unchanged,

$$\frac{\lambda^2}{\lambda_0^2}=\frac{L_0+L_x}{L_0}$$

and

$$1+\frac{L_x}{L_0}=\frac{1}{\alpha^2}=\frac{1}{(1-\delta)^2}=1+2\,\delta$$

approximately if δ is small. Hence

$$L_0=\frac{L_x}{2\,\delta}$$

and a vertical aerial with no added inductance acts to a small added inductance as if it had an equivalent inductance

$$L_0=\frac{\pi}{4\omega_0}\sqrt{\frac{L}{C}}=\frac{h}{6\times10^{10}}\sqrt{\frac{L}{C}}=\frac{hL}{2}$$

Similarly $$C_0=\frac{4}{\pi\omega_0}\sqrt{\frac{C}{L}}=\frac{8}{3\pi^2}\cdot\frac{h}{10^{10}}\sqrt{\frac{C}{L}}=\frac{8}{\pi^2}\,hC.$$

Hence for a single vertical wire :

$$L_0=h\log_\epsilon\frac{h}{r}\;10^{-9}\text{ henries}$$

and $$C_0=\frac{1}{2\cdot22}\cdot\frac{h}{\log_\epsilon\frac{h}{r}}\text{ micro-microfarads.}$$

As L_x is increased the value of C_0 will gradually increase owing to the changed distribution of the electric field. For very large values of L_x, the equivalent capacity will approximate to its electrostatic value. The author has shown * that a vertical wire with its lower end near the ground and charged with h units has an average potential of

$$2\left(\log_\epsilon\frac{h}{r}-0\cdot307\right)-1\cdot38=2\left(\log_\epsilon\frac{h}{r}-1\right)$$

and therefore a capacity of

$$\frac{h}{2\left(\log_\epsilon\frac{h}{r}-1\right)}\cdot\frac{1}{9\times10^{11}}\text{ farads.}$$

Applying these formulæ to the case where $h=100$ feet and $r=2$ mm., it is found that its equivalent capacity with no added inductance is 143, whereas its electrostatic capacity is 197 micro-microfarads.

The natural frequency of an aerial can be decreased by inserting a condenser between it and the ground. If C_x is the capacity of this condenser, then

$$C_x=-\frac{1}{\omega_0}\cdot\sqrt{\frac{C}{L}}\cdot\frac{\tan\alpha\,\pi/2}{\alpha},$$

where α is now greater than unity; thus for a single wire with $h=100$ feet and $r=2$ mm., if $\alpha=1\cdot2$, *i.e.*, if $\lambda=0\cdot833\lambda_0$,

$$C_x=288\cdot5\text{ micro-microfarads.}$$

* See *Electrician*, August 28th, 1914.

By making C_x very large and putting $\alpha = 1 + \delta$ it can be shown that the equivalent capacity, $C_0 = 2\,\delta\,C_x = \frac{4}{\pi\,\omega_0}\sqrt{\frac{C}{L}}$ as already found by adding inductance.

We turn now to the consideration of aerials of the T, L, and umbrella types, in which the capacity of the upper part is usually increased by causing a number of wires to radiate from the top of the vertical part. If a transmission line branches at any point, the joint impedance of the two branches will, if they are similar, be a half of that of either branch alone, and this joint impedance constitutes the load at the end of the common section. The apparent impedance at the foot of an umbrella antenna is equal to that of the vertical part considered as a transmission line of length h, with a load at its far end having an impedance equal to the joint impedance of the branches or ribs of the umbrella. This latter is not an easy thing to determine, but, were it not for the mutual action between the ribs, it would be equal to the impedance of one rib divided by their number. An umbrella or T type of antenna can be reduced to an equivalent L type by making the length l of the horizontal part of the latter equal to that of one of the ribs of the umbrella or T and endowing it with an inductance L_2 and a capacity C_2 per unit length, equal to the joint or resultant values of the ribs in parallel. Thus the span of the L antenna would have twice the capacity and half the inductance per unit length of that of the T antenna. For convenience the horizontal part is shown in Fig. 5 as a continuation of the vertical part.

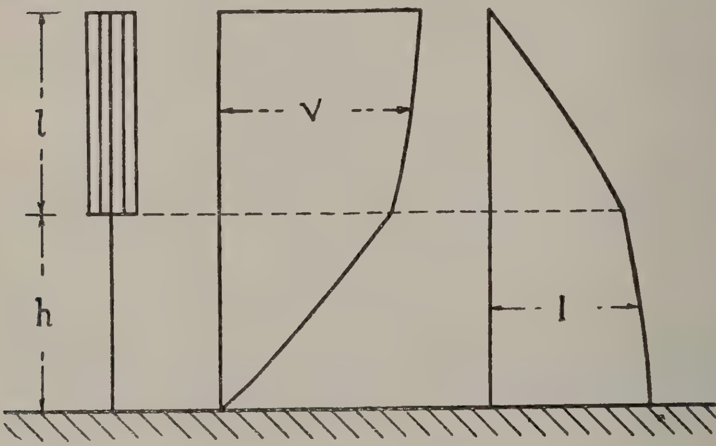


Fig. 5

We have therefore a line of length h with inductance L_1, and capacity C_1, per unit length, in series with a line of length l with inductance L_2 and capacity C_2 per unit length, the latter being open at the far end. The formulæ for such cases are well known to telephone engineers, and it is easy to show that when tuned to resonance, that is, when the impedance at the sending end is zero,

$$\sqrt{\frac{L_2}{C_2}} \cdot \frac{1}{\tan 2\pi l/\lambda_0} = \sqrt{\frac{L_1}{C_1}} \tan 2\pi h/\lambda_0.$$

This enables one to determine λ_0 from the lengths and characteristics of the two parts of the aerial. The distribution of current and P.D. can be calculated, and will be approximately as shown in Fig. 5, if $C_2 = 4C_1$ and $l = h$. In this case $\sqrt{\frac{L_1}{C_1}} = 4\sqrt{\frac{L_2}{C_2}}$;

$$\tan 2\pi l/\lambda_0 = \tan 2\pi h/\lambda_0 = \tfrac{1}{2}$$

and

$$\lambda_0 = 13{\cdot}6\, h = 6{\cdot}8\, (h+l).$$

It will be noticed that the whole of the upper portion is raised to nearly the same potential, whilst the amplitude of the current is almost constant throughout the vertical portion.

The effect on the natural frequency of inserting inductance between the antenna and earth can also be calculated very simply, with the following result :

Let $C_2/C_1 = L_1/L_2 = \gamma$; $l = nh$; $2\pi h/\lambda_0 = \beta$ and $\lambda_0/\lambda = \omega/\omega_0 = \alpha$, then the added inductance

$$L_x = \frac{1}{\alpha\omega_0} \cdot \sqrt{\frac{L_1}{C_1}} \left(\frac{1/\gamma - \tan\alpha\beta \cdot \tan n\alpha\beta}{\tan n\alpha\beta + 1/\gamma \tan\alpha\beta}\right)$$

When L_x is very small the aerial has an equivalent inductance :

$$L_0 = \frac{L_x}{2\delta} = \frac{h}{6\times 10^{10}\gamma} \sqrt{\frac{L_1}{C_1}} \cdot \left(\frac{\tan\beta + n\tan n\beta + \gamma(\tan n\beta + n\tan\beta)}{\tan n\beta\,(1+\tan^2\beta)}\right)$$

As an example, if $l = 3h$, $C_2/C_1 = 4$, and it be required to increase the wave-length to $1{\cdot}1$ times its fundamental value,

$$L_x = 0{\cdot}065\, \frac{1}{\omega_0} \sqrt{\frac{L_1}{C_1}} \text{ henries.}$$

For the equivalent inductance of this aerial, when $L_x = 0$, we get

$$L_0 = \frac{0{\cdot}41}{10^{10}}\, h \sqrt{\frac{L_1}{C_1}} \text{ henries;}$$

its natural wave-length $\lambda_0 = 24{\cdot}6h = 6{\cdot}15(h+l)$, and its equivalent capacity :

$$C_0 = 4{\cdot}15\, \frac{h}{10^{10}} \sqrt{\frac{C_1}{L_1}}$$

$$= 1{\cdot}04\, \frac{(h+l)}{10^{10}} \sqrt{\frac{C_1}{L_1}} = 3{\cdot}12\, (h+l)\, C_1.$$

If the lower part had been carried on to a total height of $h+l$, its equivalent capacity would have been only

$$0{\cdot}267\, \frac{(h+l)}{10^{10}} \sqrt{\frac{C_1}{L_1}} = 0{\cdot}8\, (h+l)\, C_1.$$

The difficulty in applying these formulæ to actual examples lies in the uncertainty as to the values of L_1, C_1, L_2 and C_2 to be inserted. As has been already pointed out, the values generally employed in telephonic transmission problems are based on the assumption that each centimetre is a part of an infinitely long line, and that the wave-length

is very great compared with the distance between the conductors. If the capacity per unit length varies along the line, the formulæ are no longer applicable in their simple form. It was shown that with an unloaded vertical wire one was justified in assuming that the electric field had a certain ideal distribution, but even then a constant value of C_1 was only obtained by the doubtful expedient of replacing the cylindrical wire by an inverted cone of the same mean radius. In actual antennæ the distribution of the electric field is so complex that, quite apart from radiation, it is not only impossible to calculate the values of the L_1 and C_1 with any accuracy, but, since they would undoubtedly vary from point to point along the antenna, it would be impossible to employ them in any simple formula. It is possible, however, and desirable, to make certain simplifying assumptions along the lines indicated in this paper, and to carry out the calculations in a number of actual cases, which can be subjected to experimental investigation. By comparing the calculated values with the observed wave-lengths and equivalent capacities, information will be obtained which should enable one to interpret correctly any future calculations.

The upper limit of the capacity of the aerial, to which the equivalent capacity approximates as the wave-length is increased by the insertion of inductance, is its steady electrostatic or low-frequency value, as determined by a ballistic galvanometer or bridge method. The author has shown how * this capacity can be calculated, even in the case of multiple aerials of elaborate design, and also how the effects of masts and buildings can be determined. Briefly, the method consists in assuming that the charge is uniformly distributed over every piece of wire in the aerial and calculating the resultant average potential. The assumption is then made that this average potential is approximately equal to the actual uniform potential of the aerial when the same total charge has its natural distribution. For detailed calculations and a large number of working formulæ and curves the reader is referred to the author's original papers.

The effects of buildings and of wooden masts in a high-frequency electric field are often very different from those in an electrostatic field since, in the former case, their high resistance prevents them charging and discharging sufficiently rapidly, so that they act as imperfect dielectrics rather than as conductors. The loss of power in such dielectrics may be considerable.

Except for these secondary effects, the calculated electrostatic capacity will agree fairly closely with the equivalent capacity of the aerial when so much inductance is inserted that its wave-length is considerably greater than the fundamental value, as is now very commonly the case, especially in large stations designed for long distance transmissions.

An approximate lower limit for the capacity can be calculated from the formulæ established in this paper, by taking the values of C_1 and C_2 per unit length, as if the wires were infinitely long. These values for a number of wires in parallel can be derived from the formulæ for the electrostatic capacity of multiple aerials; thus for n parallel wires in one plane, spaced at a distance d apart, and uniformly charged

* *Electrician*, Vol. LXXIII., pp. 829, 859, 906; Vol. LXXV., p. 870; Vol. LXXVII., pp. 761, 880.

with one unit per cm. of wire, the average potential due to its own charge is :

$$2\left[n\left(\log_\epsilon \frac{l}{d} - 0{\cdot}307\right) + \log_\epsilon \frac{d}{r} - B\right]$$

whilst that due to the earth, if l is very great, is :

$$-2n\left(\log_\epsilon \frac{l}{2h} - 0{\cdot}307\right)$$

giving a resultant potential of

$$2\left[n \log_\epsilon \frac{2h}{d} + \log_\epsilon \frac{d}{r} - B\right]$$

and therefore a capacity C per unit length of aerial of

$$\frac{n}{2\left(n \log_\epsilon \frac{2h}{d} + \log_\epsilon \frac{d}{r} - B\right)} \times \frac{10^{-6}}{0{\cdot}9} \text{ mfds.}$$

(For values of B see *Electrician*, Vol. LXXIII., p. 829.)

Similarly for a 4-wire antenna of the box type the capacity C per unit length is

$$\frac{4}{2\left(4 \log_\epsilon \frac{2h}{d} + \log_\epsilon \frac{d}{r} - 0{\cdot}35\right)} \times \frac{10^{-6}}{0{\cdot}9} \text{ mfds.}$$

where h is the height above the ground of the horizontal antenna.

As a final example we may consider a T antenna 200 feet high, 600 feet span, consisting of ten parallel wires spaced 4 feet apart, the ten leading-down wires arranged fan-shape to meet at a point on the ground, as shown in Fig. 6 ; radius of wire $=0{\cdot}048$ inch.

The above formula gives for either branch of the horizontal portion,

$$C = \frac{10}{2\left(10 \log_\epsilon \frac{400}{4} + \log_\epsilon 1000 - 9{\cdot}8\right)} \times \frac{10^{-6}}{0{\cdot}9}$$

$$= 0{\cdot}13 \times 10^{-6} \text{ mfds. per cm.}$$

and therefore the resultant C_2 of the two branches $=0{\cdot}26 \times 10^{-6}$ mfds.

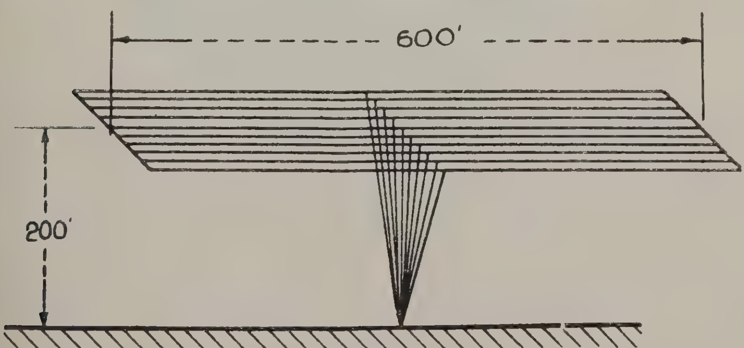


Fig. 6

per cm. For the vertical portion, taking the spacing at half the height, we have

$$C_1 = \frac{10}{2\left(10 \log_\epsilon \frac{200}{2} + \log_\epsilon 500 - 9{\cdot}8\right)} \times \frac{10^{-6}}{0{\cdot}9} \text{ mfds. per cm.}$$

$$= 0{\cdot}13 \times 10^{-6} \text{ mfds. per cm.,}$$

The assumption originally made that the vertical portion was conical applies approximately to such a fan-shaped arrangement of wires.

In the present case $\gamma = C_2/C_1 = 2$ and $n = l/h = 300/200 = 1{\cdot}5$ $\tan\beta \tan n\beta = 1/\gamma \therefore \tan \beta = 0{\cdot}542$; $\tan n\beta = 0{\cdot}922$; $\beta = 2\pi h/\lambda_0 = 0{\cdot}496$ and $\lambda_0 = 771$ metres.

Inserting these values in the formula for L_0 we find that

$$L_0 = 58{\cdot}5 \times 10^{-6} \text{ henrys}$$

and therefore

$$C_0 = 2{\cdot}86 \times 10^{-3} \text{ mfds.}$$

This is the equivalent capacity when no inductance is inserted.

Now the calculation of the electrostatic capacity of this aerial is done in detail in *The Electrician*, Vol. LXXIII., p. 909, and the final result there found is $3{\cdot}14 \times 10^{-3}$ mfds.

Both these results may be affected by the proximity of masts and buildings.

It will be noticed that the equivalent inductance is only 58·5 microhenrys, so that very small inductances connected between the aerial and earth will cause considerable increases in the wave-length.

Photo by *Theodor Weijnen, Maestricht.*

M. AUGUSTE COLLETTE, CHIEF ENGINEER, NETHERLANDS STATE TELEGRAPHS.

[*To face page 704.*

THE HEAVISIDE LAYER.

By E. W. Marchant, D.Sc., M.I.E.E.,
Professor of Electrical Engineering in the University of Liverpool.

THE experiments made by Marconi in 1901 and 1902 in sending signals from Poldhu to Newfoundland were the first to bring to the notice of wireless telegraphists that there were factors to be considered which affected long distance transmission of wireless signals that had hitherto been neglected. Many explanations were forthcoming of the remarkable result by which, with an antenna a few hundred feet high, signals had been sent round or over a wall of water and earth nearly one hundred miles high, between the transmitting and receiving stations. Two obvious theories were advanced —the first, that the transmission was not really effected by electromagnetic waves at all, but by currents distributed over the surface of the earth or water, a theory which had many facts to support it, the most notable of which was that the signals were transmitted more readily over sea-water than over land. This theory was further developed by Sommerfeld, who elaborated the calculations involved in the transmission of surface waves, and showed that with such waves the amplitude of the wave at a distant point diminishes not inversely as the square of the distance from the transmitting station, as it does with space waves, but only inversely as the square root of the distance. This theory still deserves consideration, as it seems likely that some of the energy received at a station may be transmitted by such means ; it is a matter which was discussed in a paper read recently before the Institute of Radio Engineers of New York by L. W. Austin, wherein a number of measurements are given of the strengths of signal received at Darien from Arlington and other stations as far distant as Honolulu on one hand and Eilvese on the other. The strength of signal received at Darien from Eilvese, 5,700 miles distant, calculated by Sommerfeld's theory, is measured by an audibility on the shunted telephone of 15, whereas that actually observed was 200, while the value calculated from the American Navy formula would give an audibility of over 700. (The " Navy " formula, although not giving good results at Darien, gives values of the signal strengths received at Washington from Eilvese which agree closely with those actually observed.)

The second, and perhaps more obvious, theory is that the waves were diffracted round the earth's surface, and calculations have been made, and the theory of such transmissions worked out, notably by Professor H. M. McDonald. J. W. Nicholson has calculated, however, that a station of more than a million kilowatts capacity would be required at Clifden to produce audible signals at Buenos Ayres if diffraction alone was the cause of their transmission.

In 1900 Heaviside put forward the suggestion that there existed in the upper regions of the atmosphere a permanently ionised layer

capable of reflecting electromagnetic waves. This layer has been called the Heaviside layer, and the wonderful result of the transmission of signals from Clifden to Buenos Ayres, and that more recently recorded, of signals sent from Tuckerton, New Jersey, being received by the s.s. *Ventura* when 530 miles S.W. of Samoa, a distance approximately of 8,000 miles, or nearly a third of the circumference of the earth, away from Tuckerton, have increased the interest which Marconi's original experiments aroused.

The Heaviside layer is supposed to consist of a mass of ionised clouds or fog in the upper regions of the atmosphere, at a height of about 50 miles, which acts as a reflecting shell and behaves like an outer corona or spherical envelope to the earth, against which the electromagnetic waves which transmit wireless signals impinge and from which they are reflected in much the same way as a hollow sphere with the inner surface made reflecting would reflect all light produced inside it. Although the earth and the Heaviside layer by this analogy might be regarded as equivalent to a polished ball with an outer concentric shell, having its inner surface polished, the phenomena occurring in wireless cannot be compared exactly with that existing in the space between the inner and outer spheres of such a model. In the first place, the outer surface or shell which forms the Heaviside layer does not behave in the same way as a simple reflector of waves, it probably consists of masses of ionised gas which do not reflect the long waves which impinge on them in the same way as light waves are reflected from a mirror, because the irregularities at the surface are of the same order of magnitude as the length of the waves which impinge on them, and also because the clouds or masses of air do not possess a sharp boundary from which the waves may be reflected. The process that goes on must be a combination of refraction and reflection of the incident radiation similar to that which might be observed at the surface of a gas which is undergoing liquifaction under pressure and in which a considerable mass of the substance between the gas and the liquid portion is in process of transformation from one to the other. In the case of the Heaviside layer the atmosphere is, of course, becoming gradually rarer as the height above the ground increases; it is becoming gradually more completely ionised, and therefore more reflecting to the radiation which falls on it. Dr. Eccles has calculated that the presence of charged ions in a gas will increase the velocity of propagation through the gas; if this concentration is small the increase in velocity of propagation is proportional directly to the concentration of the ions, with the consequence that the velocity of propagation of electric waves through the upper regions of the atmosphere will increase with increasing altitude, so that the waves will be bent by a kind of refraction and follow roughly the earth's curvature. The remarkable results published recently by Mr. L. F. Fuller before the American Institute of Electrical Engineers in which he showed that a series of maximum and minimum values occurred in the signal strength received at one station from signals of constant strength but varying wave-length, from another 3,700 km. away, throws a great deal of light on the probable passage of the waves between the two stations. Dr. Eccles * has suggested that the sudden change in strength

* *Electrician*, vol. 89, p. 1016.

may be due to "capricious variations of the ionic conditions of the atmosphere large enough to produce dispersion in consequence of the dependence of the index of refraction on the frequency," but there is a simpler explanation than this, which may be worth consideration. The curves and successive minima and maxima obtained by Fuller certainly suggest that there exists in the atmosphere something analogous to interference between two beams or rays of radiation. It may readily be shown by the well-known theory of the formation of interference bands between two flat parallel surfaces that the difference in path between two beams, one supposed to be transmitted along the surface of the earth in accordance with Sommerfeld's theory, and the other reflected backwards and forwards between the Heaviside layer and the surface of the earth, is far too great to be consistent with Fuller's observations of maxima and minima with varying wave-length. A calculation of this kind has been made by the author,* and he finds that in order to get an interference band nine miles wide between the position of darkness and the position of lightness (the distance observed in Fuller's observations) it would be necessary to assume a ray which was reflected 35 times up and down between the earth's surface and the Heaviside layer in its passage from the sending station to the receiving station. It is, of course, extremely unlikely that a ray can pass between two such distant points on the earth's surface in this manner. From all that is known of the nature of the Heaviside layer its surface is irregular, and nothing like a regular reflection is to be expected from it. Moreover, the difference in length of the path for the two interfering rays involved in such an assumption amounts to nearly 600 miles, whereas the difference in length of path estimated from the interference curves gives a difference in length of path of only 15–20 miles. This latter result is quite consistent with the assumption of an irregularly reflecting surface at a height of about 50 miles, from which rays or beams are scattered more or less irregularly. It may be shown quite easily that apparent interference "bands" or spaces, where signals are alternately strong and weak (they are really "interference patches," or areas where the two sets of waves combine to strengthen each other and mutually neutralise each other respectively), will be formed under such conditions without making any assumption as to the effect of wave-length on refractive index.

In Fuller's experiments two places nine miles apart were used as observation stations, and it was found on several occasions that signals received at one of these stations on a given wave-length were strong, while the signals at the other station became weak. The conditions which may be assumed to explain this phenomena are shown in Fig. 1 (next page), where two patches of cloud or ionised air are assumed to exist at the height usually assumed for the Heaviside layer, and against these clouds impinge the rays of electromagnetic waves which have been transmitted, probably by irregular refraction round the surface of the earth. These two regions are marked A and B in the figure; the two stations are marked X and Y. The waves which are assumed to strike the surface A are scattered in all directions, some of the rays going in the direction of X and others in the direction of Y; the same thing happens at the other surface, and it is easily seen that the

* Proc. Inst. Radio Engineers, December, 1916.

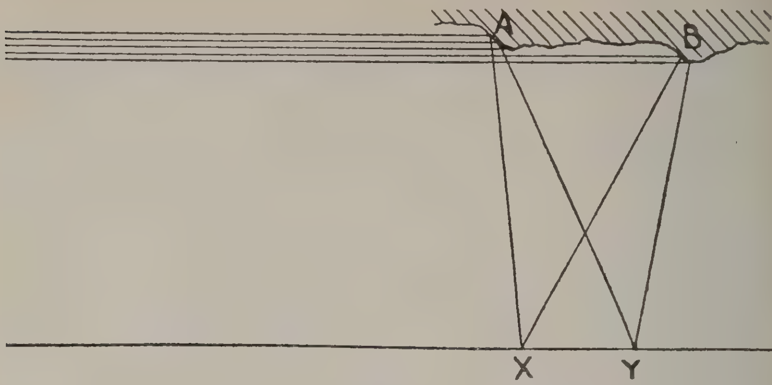


Fig. I.

difference in path for the ray going from A to X direct and that going from B to X may be an odd number of half wave-lengths, while the difference in path for the ray going from A to Y direct and that going from B to Y may be an even number of half wave-lengths. For a slightly different wave-length this condition may be reversed, signals at X being strong and those at Y weak. The diagram may easily be drawn to represent the conditions observed in the experiments made by Fuller. This figure is purely diagrammatic and demonstrative, and does not attempt to represent actual conditions, about which it is evident that, at present, we have not sufficient information. It is interesting to note, however, that the assumed height of the Heaviside layer combined with the assumed position of the reflecting or scattering surfaces does give a difference in path for the interfering rays which may be calculated from Fuller's observations of the variation in signal strength between two fixed stations when the transmitting wave-length is altered. This result, in combination with other facts, seems to provide a considerable weight of evidence in favour of the Heaviside layer or cloud theory.

That the atmosphere has a great deal to do with the transmission of wireless signals was made evident by the well-known fact that signal strength at night is usually very different from that during the day. This fact was first definitely established by Marconi in 1902, and a great deal of attention has been paid to the explanation of the remarkable variations in the signal strength at Clifden due to signals transmitted from Glace Bay in Nova Scotia, and from many other recorded phenomena. It is evident that such results would be difficult, if not impossible, to explain unless the atmosphere played a very important part in the transmission. Professor Kennelly, in a paper on Daylight Effects in Radio Telegraphy, showed that "changes of intensity of signals near sunrise and sunset may be explained by reflection effects which may be expected at the boundary surface or shadow walls between darkness and illumination." The "sunset" phenomenon is known to every wireless operator as well as the fact that signal strength variations are much greater in winter than in summer, both of which phenomena give clear evidence that the lightness or darkness

of the atmosphere produces an effect on signal strength. The only difference between a dark atmosphere and a light atmosphere from the point of view of wireless transmission is that the light atmosphere contains a larger number of ions, and is therefore more conducting and less transparent than one on which no light is falling. A calculation has recently been made by Cohen that Austin's results could be represented by a formula of the form :

$$I_R = \frac{K}{D}(1 + ND)\ \epsilon^{-.00195 \frac{D}{\sqrt{\lambda}}}$$

where I_R = received antenna current.

D = Distance between transmitting and receiving station.

λ = Wave-length, and K and N are constants.

This expression for the received current contains in the coefficient a term ND proportional to the distance between the two places. This may be explained on the assumption that the signal received at any point is made up of a number of rays reflected irregularly from the lower cloud surface of the Heaviside layer. The number of these scattered rays striking any point will be roughly proportional to the distance between the places, though, of course, the quantity ND is less than unity—*i.e.*, the reflections do not represent more than a fraction of the energy received. This evidence, however, is not of such weight as that cited above, since it depends only on an empirical representation of recorded results.

It may be of interest, in conclusion, to summarise the history of the Heaviside layer theory and some of the propositions that have been put forward to explain its existence. Erskine Murray * has suggested that the first idea of the Heaviside layer was due to G. F. Fitzgerald, who, in a paper to the British Association, in 1893, on the probable period of an electrical oscillation on the earth as a whole, says : " But the hypothesis that the earth is a conducting body surrounded by a non-conductor is not in accordance with the fact that the upper regions of the atmosphere are fairly good conductors." This hypothesis, however, cannot have been very new, even in 1893, since it was known, many years before, that rarified gas was a fairly good conductor of electricity, and also that at high altitudes the gas of the atmosphere must be rarified. Sir James Dewar, as Professor Fleming recently stated, was one of the first to draw attention to this upper layer. In a lecture to the Royal Institution in 1902 he pointed out that there were really two parts to our atmosphere, the lower part in which atmospheric currents circulated, and in which the constituents were similar to those of the atmosphere, and the upper part in which the distribution of gases was governed by their density. This, again, is not a complete statement of the theory of the Heaviside layer, the essential feature in which is that it is supposed to consist of ionised gas, and that the ionisation of the gas which gives it conductivity is the factor which really makes it operative in affecting wireless telegraph signals. Dr. Eccles, in a paper to the British Association in 1912, gives some interesting indirect evidence of the existence of this upper layer of ionised gas. He cites the observations of several astronomers —notably Newcomb and Yntema—who have measured the total light

* WIRELESS YEAR BOOK, 1913.

coming from the sky, and found it much greater than the sum total of the light coming from the stars, and suggests that if a permanently ionised upper layer of the atmosphere or luminous corona be assumed it would explain this phenomenon. Dr. W. J. Humphrey, in 1912, put forward the suggestion that the outermost layers of our atmosphere are kept permanently ionised by dust of cosmical origin, and, in a lecture delivered recently at the Royal Institution, Professor Fleming has suggested that at heights of the order of 50 miles, where the ordinary constituents of the atmosphere disappear, and are replaced by hydrogen, helium, and possibly other lighter gases, the most likely agency in producing ionisation is the solar dust projected from the sun and transmitted to the earth through the agency of light pressure. This explanation of the production of an upper ionised layer of gas is supported by the fact that the time interval elapsing between the passage of a sun spot across the solar meridian and the corresponding magnetic storm is about 45 hours, a figure which agrees fairly closely with the time Professor Fleming calculates that a particle, of 1,200 Angstrom units diameter, would take to pass from the sun to the earth. Another proof of the existence of the Heaviside layer is the fact that the nature of the intervening ground between two distant stations does not affect the strength of signals to any great extent during the night. This result is fairly obvious, if it be assumed that at night the smaller conductivity of the middle atmosphere (the ionisation of which is produced almost entirely by light) allows the electromagnetic waves to travel upwards and strike the outer strongly ionised Heaviside layer, which reflects the waves down and gives the strong night signals. This phenomenon has been observed on many occasions. Schwartzkaupt, in the E.T.Z. of February, 1910, records some remarkable variations in the strength of signals received in Genoa harbour from Norddeich. At night the signals were as strong as over sea at the same distance, though much weaker in the daytime,* and some similar results have been observed in the Pacific, where the night signals received from Tuckerton across the American continent have been as strong as those received over the same distances of open sea. All the evidence now recorded supports the view that the Heaviside layer exists, and that it exercises an important influence on the strength of wireless signals received over very long distances.

* These signals would pass over the Alps.

WIRELESS TO THE RESCUE.

A Few Remarks on a "Roll of Honour" (Compiled by the Marconi Wireless Telegraph Company of America) Recounting a Number of Achievements of Radio-Telegraphy at sea.

By H. J. B. Ward, B.A.

If wireless telegraphy had nothing else to put to its credit, the list of "timely rescues" recorded in the following pages would far more than justify any feelings of pride which might animate its inventor and pioneers. Inasmuch as tables and lists make a somewhat cold appeal to the generality of readers, it may not be out of place to prefix them with a few remarks which may serve to indicate the wonderfully dramatic human interest possessed by our schedule.

It will be noticed, in the first place, that our data deal with merchant shipping alone, and in its initial stages the growth of wireless telegraphy in the mercantile marine was necessarily slow. When the first vessel was equipped, its communication was limited to the *one* coast station at that time established, so that the immediate value of the invention failed to "strike home" upon the less imaginative and observant. Slowly but surely, however, the new means of communication continued to adduce proof after proof of its value; and in our list we see striking examples of the value of wireless, occurring with greater and greater frequency as the number of vessels equipped and coast stations established have been progressively increased.

It is frequently said that Englishmen are innately conservative and slow to move; but the same remark might not unfairly be applied to the human race in general. "Whatever is, is right," an excellent apothegm in its way, has been too often taken to imply that what does *not* already exist is probably wrong! It was not until wireless telegraphy had for nearly eighteen years been demonstrating its priceless utility for seagoing vessels that the British Government issued, on the 20th of July, 1916, an Order in Council insisting upon the provision of a wireless installation in the case of "every British ship of 3,000 tons gross tonnage or upwards." Now that this step has been taken by the greatest maritime power in the world, other nations are rapidly following suit; a similar regulation has been issued by the French and Italian Governments; and, doubtless, will be made universal as soon as the present struggle is over.

Geometrical, not Arithmetical, Progression.

By way of exemplification of the above remarks, we would point out that the rescue of the crew of the s.s. *R. F. Matthews* in 1899 is followed by a gap of two years, so that our record does not become continuous until we reach the year 1907. The entries to the credit of wireless telegraphy necessarily increase in frequency far more than proportionately to the number of commercial vessels equipped; in mathematical language, the rate of development proceeds rather by "geometrical" than "arithmetical" progression. The advantages derived from the

installation of radio apparatus on mercantile shipping cover a wide range. They include the offering to owners of chance of maintaining constant touch with their ocean-going property throughout the voyage, a procedure which involves consequent opportunities for changing the route or destination of the vessels in accordance with the advantages which may accrue to them from such change, and which involves also the certain gain of knowing exactly at what date and almost at what hour they are likely to reach their destination. This latter advantage leads to the natural result that preparations for immediate handling of passengers and cargo may be effected in advance, a course entailing an infinite amount of economy in time and expense.

Again, any passengers who may be carried, are able to maintain their personal and business relations with friends and clients at both ends almost throughout the whole voyage, and the ever-increasing amount of " traffic " handled by wireless operators bears eloquent testimony to the recognition of these facilities by ocean-voyagers. Our present list, however, deals only with the still more important subject of Safety at Sea, a matter which, from the very start of wireless activities, received preferential attention, which formed the subject of special codification in the Berlin Conference of 1910 ; and which in the current International Rules, as laid down by the London Conference of the 20th January, 1914, takes precedence with regard to its calls over all other messages. We may remind our readers that under the provision of this latter Act, binding upon all the signatories thereto (and these include practically all the civilised Powers of the world), any captain receiving a wireless appeal for help is bound to take immediate steps, not only to pass on such an appeal to others, but to answer it himself, or—in default thereof—to be prepared to give the most substantial and convincing reasons for omitting to do so. It is only fair to merchant skippers to say that throughout the history of wireless they have shown the greatest zeal in the fulfilment of such duties.

Wireless Life-Saving Net.

If readers will allow their imagination to dwell upon some of the instances in our tabulated records (such as the case of the freight steamer *Columbian*, whose occupants were saved from fire on May the 3rd, 1914) wherein is noted the fact that the rescue has been effected through the passing of wireless messages from ship to ship, they will realise what is signified by the term a " Wireless Net." A dramatic instance, more recent than any of those included in our list, may serve to illustrate what actually happens. The *Pio Nono*, a vessel of 6,500 tons en route from New Orleans to Barcelona, encountered a series of severe storms culminating in an hurricane with heavy cross seas. After having been for some time subjected to this severe buffeting, she became waterlogged to such an extent that it was thought best to abandon her. Four boats were successfully launched and the officers and crew, numbering between 60 and 70, were split up between them. The little craft endeavoured to keep together, but the heavy sea rendered their efforts unavailable. One of them containing the ship's doctor was, fortunately for the occupants, picked up by a steamer before they had been many hours adrift. As soon as the captain of the rescuing vessel learnt that there were three other boatloads still in

peril, he set to work to search for them ; but meeting with no success, started radiating wireless messages calling upon those who received them to aid in the search. The disaster occurred on one of the main routes of ocean travel and the signals of distress were therefore picked up by a number of other steamers who in their turn started radiating the same message. Thus, the æther surmounting the sea within the whole immediate radius of the accident was pierced by a perfect network of wireless messages all circulated with the object of rescuing the unhappy men in the three other boats. Eventually one of the other vessels sent out a message announcing that she had picked up another boatload. The final two appear to have vanished for ever. There is something very moving about this sweeping of the sea with a wireless net for the purpose of succouring sailors in distress, which seems to fulfil (though in a slightly different sense) the famous prophecy of the Divine Founder of Christianity, " Ye shall become fishers of men."

To return to our list :—think what a number of wonderful dramatic stories are here recorded in a few words ! Take, for instance, the entry against January the 23rd, 1908, wherein is briefly recorded the ramming and sinking of s.s. *Republic* by the steamship *Florida* off the Nantucket Lightship. " Aid," we read, " was promptly summoned by wireless and 761 passengers saved." Can we not picture, as we sit comfortably reading by our fireside, the great liner, carrying a number of persons as numerous as the entire population of many a small country town, suddenly transported in a few minutes from a state of assured safety and comfort to one of extreme peril and risk ! These anxious passengers on board scan the horizon on yonder bleak January day in search of assistance and see none. What must have been their feelings ? In those days the generality of folk were unacquainted with the resources provided by the aerials, stretching like the thin strands of a spider's web above their heads, so that when in answer to a totally invisible and impalpable appeal, rescuing vessels were summoned from distances far out of sight to save the anxious watchers and their loved-ones from imminent death, it must have seemed to many a husband, brother or parent on that ill-fated vessel as though they had returned to the primeval days of direct providential miracles !

Collision at Sea.

We might go on indefinitely, referring to the more dramatic stories enshrined in the columns of our table. It would be easy, for instance. to dwell at length upon such an outstanding instance as the rescue effected in the case of the P. & O. steamer *Delhi*, with her distinguished passengers (amongst whom were numbered Their Royal Highnesses the Duke and Duchess of Fife). This luxurious liner found herself in a most dangerous situation, when on December 13th, 1911, she stranded off the Moroccan Coast ; and it was mainly due to the instrumentality of wireless that she escaped without a single fatality. Or we might recall the disaster which befell the *Titanic* on April the 15th, 1912, when all the hundreds on board would almost inevitably have been drowned but for assistance summoned by wireless telegraphy. To deal thus fully with our subject would, however, be to risk wearying our readers, and we choose rather to refer them to the table itself, whose brief dry record will be found to provide ample material for the composition of a complete gallery of mental pictures, not only realistic, but real.

The case of the *Republic*, to which we have referred above, constitutes a typical example of the way in which wireless comes to the rescue in cases of collision at sea; whilst the disaster to the *Titanic* forms an unforgettable instance of the perils of ice, even to the finest marine construction the ingenuity of man can evolve. This latter catastrophe is responsible *inter alia* for an arrangement made between the British and U.S.A. Governments for providing ice-patrol vessels on the North Atlantic steamer route, to give wireless warnings of the presence of icebergs. Since the outbreak of the present war the Government of the U.S.A. has nobly undertaken this service single-handed, and one of the recent reports of the American Government records the fact that their patrol vessel, the s.s. *Seneca*, in June, 1916, encountered a berg, whose pinnacles, when first sighted, towered 200 ft. above the water, whilst the whole mass measured about 400 yards. The *Seneca* "stood by" this gigantic peril to mariners for *eight days*, radiating wireless warnings all the time. The number of possible disasters thus avoided it is impossible to estimate; but it is worth while to note: first, that their reception demands wireless equipment equally with their radiation; and secondly, that—"prevention being better than cure"—such lists as we are dealing with here are very far from exhausting the record of the achievements at sea performed by radiotelegraphy.

Ice Warnings.

In 1851, during the earlier days of ocean steamship construction and organisation, the Royal Mail Steam Packet Company, which for years at that period led the way, sent to sea their Steam Packet *Amazon*, "the last word" in mercantile marine construction of the day. She was a brand new ship, on her maiden voyage, full of passengers and cargo—and totally disappeared leaving "not a wrack behind." Nothing was ever heard of her; but a few charred pieces of wood told the sad tale of total destruction by fire at sea. It was an awful catastrophe, making a deep and enduring impression upon the travelling public. Here is another source of danger, whose peril has been largely eliminated by the equipment of vessels with wireless apparatus. Our list provides many instances wherein aid has been summoned in cases of fire at sea, notably that of the *Volturno* (10th October, 1913) to whose rescue wireless sped eleven vessels, which succeeded in rescuing from the flames no less than 521 persons. We may, however, here point our moral with a brief reference to a case which has quite recently come to our notice. When (on 14th September, 1916) the s.s. *Congress*, one of the largest units of the Pacific Steamship Company's fleet, was found to be on fire in the neighbouthood of Coos Bay, Oregon, with the flames making rapid headway and no ship in sight, the 233 passengers and 175 members of the crew who constituted her personnel found themselves in a predicament that might well have cowed the stoutest heart. Captain Cousins, who was in command, ordered the vessel to be headed for the nearest point on the coast, and instructed the wireless operator, Mr. R. H. Brower, to send out the SOS message. As soon as the telegraphist proceeded to the execution of his duty, however, tests showed that the fire had cut off the power of the main set, and the auxiliary equipment had to be used in order to flash the appeal. The Marconi Station at Eureka was the first to answer, although the naval installation at

Fire.

Cape Blanco came in only five minutes later. Ten miles off Coos Bay Bar, when the decks of the *Congress* were scorching, those on board, half choked by smoke, and the vessel plainly in imminent danger of being completely enveloped in flames, everyone, passengers and crew alike, took to the boats. It was indeed fortunate that rescue craft were already on the scene; for hardly had the personnel of the unhappy vessel left her than she flared up like a torch, the flames spreading from stem to stern, as if to impress the occupants of the lifeboats with the awful fate from which they had so narrowly escaped.

A cursory inspection of our list will show that yet another prolific source of danger arises from serious damage to machinery, or from some other constructional accident at sea, which may render the vessel helpless. Such an one happened in the case of the *City of South Haven* (with 100 passengers on board) on June 27th, 1909, when she lost her rudder in a heavy sea, and in that of the s.s. *Camino*, which on October 19th, 1912, dropped her propeller in mid-ocean. Accidents like these, inevitable even with all the care exercised by modern shipowners, sometimes place vessels in a predicament from which nothing but outside assistance is able to save them—and such aid can usually only be secured through the intermediary of wireless telegraphy.

A curious and—up to the present—unique case of rescue through the medium of wireless is recorded on page 717. We refer to the disaster which befell the "Wellman Airship" in mid-Atlantic. It will be remembered that in 1910 an attempt was made by Mr. Wellman to cross, in the airship which he had invented, from the United States to the U.K. His craft became so damaged en route, that death seemed inevitable to the audacious voyagers. She was able, however, to get into wireless touch with the R.M.S.P. *Trent* on her way to the West Indies and New York, ship and aircraft manœuvred into touch, and all on board the airship were saved. This affair created a great stir at the time amongst the American people, and may be viewed as one of those occasions which foreshadow future eventualities. There can be little doubt that the various developments of aircraft invention brought about by the present war will be followed in peace time by an immense increase in this form of activity. The evolution of types of wireless apparatus suitable for use on the various classes of aerial vessels has immensely increased possibilities in this direction, and stimulated the progress of aviation.

Aircraft Wireless.

For the most part, the rescues to which we have referred were effected by intercommunication between ship and ship; but shore installations play their part also. Over and over again (as in the case of the s.s. *Monroe* on January 30th, 1914), the distress signals have been picked up by land stations, and the rescue effected through their intermediary. It is on account of such cases as these that countries possessing maritime seaboards are adopting the policy of multiplying the wireless stations situated upon them. Such wireless stations form an invaluable adjunct to the systems of lighthouses and lightships with which man attempts to counteract the blindly destructive forces of Nature.

We have now said enough to illustrate the supreme importance of wireless telegraphy to those who go down to the sea in ships, and for further illustrations of these we would refer readers to the summarised particulars contained in the following pages.

TIMELY RESCUES.

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1899. March 3 ..	s.s. *R. F. Matthews*	Ran into East Goodwin Lightship during fog	Wireless message brought lifeboats from shore
1901. January 1 ..	s.s. *Princess Clementine*	Reported bark *Midora* waterlogged	Tug rescued the vessel in distress
1903. December 8 ..	s.s. *Kroonland* ..	Steering gear disabled 130 miles west of Fastnet	Crookhaven communicated with and arrangements made.
1904. —	s.s. *New York* and *Friesland*	Accidents reported ..	Arrangements made by radio
1907. —	s.s. *Preston* ..	Stranded on Courtowngays Island	Assistance brought
April 10 ..	s.s. *Arapahoe* ..	Lost propeller off Cape Henlopen, Delaware	*Apache* and *Iroquois* answered call and towed vessel to port
May 8	s.s. *Prinz August Wilhelm*	Stranded Kingston, Jamaica	Aid secured by radio
1908. March 25 ..	s.s. *Seminole* ..	Stranded Point Pleasant, N.J., in fog	Salvage tugs summoned and crew saved
April 25 ..	British cruiser *Gladiator*	Sunk by s.s. *St. Paul* off Isle of Wight	Wireless used freely for rescue work
1909. January 20 ..	s.s. *Hamilton* ..	Collision with barge in Hampton Roads	Distress call brought tugs which towed vessel to port
January 23 ..	s.s. *Republic* ..	Rammed and sunk by s.s. *Florida* off Nantucket Lightship	Aid promptly summoned and 761 persons saved
February 26 ..	U.S. Revenue Cutter *Mohawk*	Stranded on Hog Back at Hell Gate	Tugs and lighters summoned
March 8 ..	s.s. *City of Racine* ..	Disabled in Lake Michigan	Radio calls saved 200 lives
March 10 ..	s.s. *Horatio Hall* ..	Rammed by *H. F. Dimock* off New England Coast	Rescuers summoned and all on board saved
June 10 ..	s.s. *Sluvonia* ..	Stranded off Azores ..	Aid summoned and 410 lives saved
June 27 ..	s.s. *City of South Haven*	Rudder lost in heavy seas..	Assistance secured and vessel towed to port. One hundred passengers on board
June 29 ..	s.s. *Mackinaw* ..	Grounded on Yukon Flats	Lighters summoned
August 11 ..	s.s. *Arapahoe* ..	Broke tail shaft near Diamond Shoals	*Huron* answered wireless call and assisted with repairs
August 14 ..	s.s. *Helen*	Grounded off Poplar Island, Chesapeake Bay	Vessel carried no wireless, but sighted by tug *Savage*. Latter's aerials brought necessary aid
August 27 ..	s.s. *Ohio*	Rammed and sunk off Alaska	Two hundred lives rescued through wireless
September 21..	s.s. *Caris*	Machinery disabled off Cape Hatteras	Wireless calls brought several ships and *Caris* towed to port
September 25..	s.s. *Zeeberg*	Stranded near Jacksonville, Fla.	s.s. *Arapahoe* saw distress signals and summoned aid by wireless
October 13 ..	s.s *Georgia* ..	Lost propeller blades in heavy sea off Kewaunee, Wis.	Tug was summoned and towed *Georgia* to port
November 1 ..	s.s. *Alliance* ..	Lost rudder off Goose, Ore.	Tugs summoned and towed vessel to port
November 20..	s.s. *Breakwater* ..	Stranded near Diamond Shoals in heavy gale	Cape Hatteras Station received wireless call and sent tugs
November 22..	s.s. *Puritan*.. ..	Broke steering gear off Benton Harbour, Lake Michigan	Towing steamers summoned

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1909. December 1 ..	s.s. *Nueces*	Grounded on French Reef, Florida	Key West Station brought *Lampasas* and Government tug
December 27 ..	s.s. *Iroquois* ..	Lost propeller north of Frying Pan Shoals	Calls answered by nine steamers and vessel towed into Charleston, S.C.
1910. January 3 ..	s.s. *Algonquin* ..	Broke tailshaft off Cape Hatteras in blizzard	Call answered by s.s. *Apache*, and vessel towed back to port
January 7 ..	s.s. *Arizona*.. ..	Disabled through explosion	Call brought out s.s. *Indiana*, which towed *Arizona* back to Chicago
February 5 ..	s.s. *Kentucky* ..	Sprang a leak, sank 210 miles East Charleston	Call answered by s.s. *Alamo*, which rescued crew
April 13 ..	s.s. *Santa Clara* ..	Foundered off Coast California	Wireless brought tug *Ranker*, which saved 95 persons
May 9	s.s. *Preston* ..	Lost propeller, rendered helpless	Wireless brought aid
July 20 ..	s.s. *Huallaga* ..	Burned at sea off Coast Peru	SOS answered by s.s. *Ucayali* which rescued all
July 23 ..	s.s. *Momus* ..	Caught fire south Cape Hatteras	Call brought s.s. *Comus*, which helped to save vessel
September 9 ..	*Pere Marquette Car Ferry* 18	Sank middle Lake Michigan	SOS received by Ludington Wireless Station and four passengers and two of crew rescued
September 21..	s.s. *Western States* ..	Disabled off Long Point, Lake Erie	Wireless summoned aid
October 18 ..	Wellman dirigible airship *America*	Helplessly drifting, Atlantic Ocean	R.M.S.P. *Trent* summoned, and rescued crew from airship
October 28 ..	s.s. *Charles Nelson*..	Went ashore, North Point Arena, Calif., in thick fog	SOS brought U.S. Revenue Cutter *McCullough* to her assistance
December 1 ..	s.s. *North Western*	Wrecked off Falee Bay, Wash.	SOS brought s.s. *Tees*, and all on board saved
December 10 ..	s.s. *Olympic*, of Alaska S.S. Co.	Wrecked on reef off Bligh Island, Alaska	SOS brought Government launches and rescued 123 persons
1911. January 25 ..	s.s. *Queen*	Fire in forward hold while off Point Reyes, Calif.	SOS brought four steamers to her assistance, and 87 passengers and crew saved
January 26 ..	s.s. *Cottage City* ..	Wrecked off Quadra Island B.C.	SOS brought aid and all rescued
April 11 ..	s.s. *Asia*	Sank off Finger Rock, South China	Wireles s calls brought *America Maru* and *Shang Siu*. All saved; also mails
May 12 ..	s.s. *Merida* ..	Rammed by s.s. *Admiral Farragut*; sank off Diamond Shoals	All saved through wireless
June 15 ..	s.s. *Western States*	Disabled while in middle of Lake Erie	Wireless brought two vessels, and all passengers saved
November 22 ..	s.s. *Prinz Joachim*..	Struck rocks at Atwoods Bay, Samana Islands	Wireless established direct, New York City. All saved
December 13 ..	s.s. *Delhi*	Stranded off Morocco Coast	Wireless answered; 86 passengers, 235 crew, 3,500 tons general cargo saved
1912. February 22 ..	s.s. *Madison* ..	Rammed by s.s. *Hippolyte Dumois*	Wireless used; all on board were saved
April	s.s. *Denver*	Collided with s.s. *El Sud* of Galveston Bar	Assistance summoned by *Denver's* calls, and *El Sud* towed into Galveston
April 15 ..	s.s. *Titanic* ..	Struck iceberg mid-Atlantic	SOS answered by s.s. *Carpathia*, which rescued 703 persons
August 16 ..	s.s. *Pleiades* ..	Ran ashore, Magdalena Bay	Aid summoned by wireless. All saved
October 19 ..	s.s. *Camino* ..	Dropped her propeller ten miles off Astoria	SOS answered by s s. *Watson*, and vessel towed safely to port

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1912. December 5 ..	s.s. *Easton*, U.S. and Dominion Transportation Co.	Struck Iroquois Reef, Lake Superior	Wireless answered by stations at Port Arthur, Ont., and Duluth, Minn., and tugs sent.
No date ..	s.s. *Advance* ..	Pilot house and bridge torn away	SOS brought assistance from three liners
1913. January 7 ..	s.s. *Rosecrans* ..	Wrecked off Pacific Coast..	SOS sent out, 1 saved, 38 lost
January 16 ..	s.s. *Veronese* ..	Wrecked at entrance to Leixões Harbour	SOS sent out and all but few were rescued
February 14 ..	Cargo schooner, *Frank B. Witherbee*	Badly damaged	SOS signal responded to by *Itasca.* All saved and vessel safely towed to Boston Harbour
March 21 ..	The *Texas*	Bound from Christiansand to Galveston, lost propeller in heavy sea	Wireless answered by *C. F. Tietgen*, of Scandinavian-American Line, which effected successful rescue
April	The *Robert Dollar* ..	*En route* from U.S.A. to Japan; her stern post and rudder broke off, leaving her helpless in heavy sea and high wind	Communication established with shore, and tug sent to assistance
June 10 ..	s.s. *Olinda*	Caught fire at sea	SOS brought U.S.S. *Nashville* to assistance of vessel
June 13 ..	s.s. *Yukon*	Struck reef off Alaskan Coast and sank	Aid summoned by wireless, and all saved
June 19 ..	s.s. *Riverside* ..	Wrecked and sank off California Coast	Wireless used; all saved
July 24 ..	*Millinocket* ..	Collision with *Persian* ..	Tug and lighter summoned by wireless; vessel successfully docked
August 18 ..	s.s. *State of California*	Crashed into reef in Gambier Bay, Alaska, and sank within three minutes	*Jefferson*, of Alaska S.S. Co., answered call, and saved 70 out of 103 on board
September 30..	s.s. *Templemore* ..	Caught fire 800 miles off American Coast	Fifty-four saved
October 3 ..	*Spokane*	Went ashore on beach off Cape Lazo, B.C.	Wireless summoned four vessels, *La Touche* picked up survivors from the lifeboats
October 10 ..	s.s. *Volturno* ..	Burned 1,000 miles west of Ireland	Wireless answered by eleven vessels; 521 lives saved
October 15 ..	*Merced*	Destroyed; wrecked off Point Gorda, Calif.	Three ships replied to SOS; s.s. *Atlas* first arrived and rescued all
Ootober 23 ..	*Stanley Dollar* ..	Struck Viti Rocks on Pacific Coast	*Tahoma* answered call. Hauled vessel off rocks October 25
October ..	s.s. *Berkshire* ..	Burned off Lookout Cove, N.C.	SOS answered by *Seminole* (Revenue Cutter), which took off passengers
October ..	*Pleiades*	Collided off Pacific Coast with unknown ship	Distress calls answered; but vessel reached port safely
November 1 ..	s.s. *Norwega* ..	Collided with s.s. *Glenlui*, 95 miles south of Hatteras	Call answered by liner. battle ship, and two Revenue cutters; all saved
November 12..	s.s. *Oravia*	Ran on rocks off Falkland Islands	Assistance summoned and all saved
November 13..	Yacht *Wakiva* ..	Ashore 180 miles south of Galveston	Marconi Station, Galveston, responded to SOS and sent tug *Senator Bailey*
November 16..	s.s *Balmes*	Caught fire in mid-ocean ..	SOS answered by s.s. *Pannonia*, which saved 125 lives
November ..	—	Great Lakes storms destroyed nineteen vessels, none of which were equipped with wireless	All vessels which were wireless equipped received warning of coming storm and sought safety

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1914. January 4 ..	Oil-tank s.s. *Oklahoma*	Broke in two about seventy miles south of Sandy Hook	Spanish s.s. *Manuel Calvo* sighted wreck and advised Marconi Sea-Gate Station. Relief despatched and 13 out of 27 saved
January 26	Yacht *Warrior*, owned by F. W. Vanderbilt	Ran aground near Savanilla on the coast of Columbia	SOS brought s.s. *Almirante*, which took off owner and guests
January 30 ..	Old Dominion s.s. *Monroe*	Collided with s.s. *Nantucket*, and sank off Hog Island in twelve minutes	SOS picked up by Marconi Station at Virginia Beach; s.s. *Nantucket* rescued 98, whilst 43 were lost
February 14 ..	Lumber schooner *Yellowstone*	In distress in storm off Pacific Coast, asked passing vessel to send out wireless call	Another lumber vessel responded to SOS and towed *Yellowstone* to San Francisco
March 17 ..	s.s. *City of Sydney* ..	Ran on Sambro Rocks, N.S.	Wireless brought tugs from Halifax; 11 passengers, 42 crew saved
April	The *Pectan* ..	Ran aground off Adam's Cove, Calif.	SOS reached *Argyl* and *Lansing*. Both were too large to enter between perilous rocks of the coast. Wrecker *Iaqua* pulled vessel off rocks
May 3	Freighter *Columbian*	Caught fire about 300 miles south of Cape Race	Passing ship sent out wireless message broadcast. Consequently *Franconia*, *Manhattan* and *Seneca* picked up 30 survivors
May 29 ..	s.s. *Empress of Ireland*	Struck by s.s. *Storstad* and sunk seventeen minutes later	SOS answered by Father Point Station. Government boats rescued 452, whilst 1,024 were lost
June 5 ..	The *Northland* ..	Ran aground on Bartlett's Reef	Wireless answered by wrecking tug *Tasco*
August 17 ..	s.s. *Prince Albert* ..	Went ashore on Butterworth Rocks in dense fog	Wireless instrumental in saving all passengers and crew
August 25 ..	s.s. *Admiral Sampson*	Sank after collision with s.s. *Princess Victoria* off Point No Point, near Seattle, Wash.	SOS sent out by *Princess Victoria* and picked up by Marconi Station in Seattle, and tugs sent out
September 1 ..	s.s. *City of Chicago*	On fire twelve miles out from Chicago	Wireless utilised and ship returned safely to port
September 18..	s.s. *Francis H. Leggett*	Sank sixty miles south of Columbia river	Marconi Station at Astoria, Ore., intercepted message and notified all ships in vicinity to look for survivors. Two persons were rescued, 70 lost
October 11 ..	s.s. *Almirante* (United Fruit Co.)	Stranded at Cartagena Harbour	All saved—66 passengers, 90 crew
October 15 ..	s.s. *Metapan* ..	Rammed and sunk by *Iowan* at entrance of Ambrose Channel, New York	SOS answered by vessels in various parts of the harbour
October 28 ..	s.s. *Proteus*, Southern Pacific S.S. Co.	*En route* New Orleans from New York. Broke main shaft and lost propeller	Wireless answered by s.s. *El Oriente*, which towed vessel into New Orleans
November 10..	s.s. *Lakeland* ..	Ashore eight miles from Alpena	Marconi Station at Cleveland, Buffalo, and Tobermory answered SOS and sent tug to her assistance
November 23..	s.s. *Hanalei*.. ..	Struck reef opposite Transmitting Station of Marconi's Transpacific Service at Bolinas, California	SOS answered by Marconi Station at San Francisco, which sent rescuers. Wireless cabin was washed away, but Operator Lovejoy established communication with shore by means of pocket flashlight, and directed work of rescue; 43 saved, 20 lost

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1914. December 8 ..	s s. *Momus* ..	Steering gear damaged ..	SOS answered by tug *El Ray*
December 11 ..	s.s. *Centralia* ..	In danger	SOS answered by steamers *Harvard* and *Bear*
December 19 ..	s.s. *Isthmian* ..	Struck rocks off San Benito Island	SOS answered by *West Virginia*, Destroyer *Perry*, and Navy Tug *Iroquois*
December 22 ..	s.s. *Honolulan* ..	Ran aground	SOS responded to by six tugs
December 30 ..	s.s. *Colorado* ..	Machinery disabled off Little Egg Harbour, New Jersey	SOS responded to by tugs, which brought vessel into New York. Crew of 35 all saved
1915. January 3 ..	s.s. *Iowa*	Crushed in ice, Lake Michigan, off mouth of Chicago River	SOS sent out but steamer sank before rescue tugs arrived; all crew saved
January 8 ..	s.y. *Wakiva* ..	Went on rocks off Tampico, Mexico	SOS picked up by four steamers. Sea prevented lifeboats reaching wreck, but crew were rescued by use of breeches buoy
January 10 ..	s.s. *Mexicano*, Pierce Nav. Co.	Ran ashore on Tampico, Mexico, breakwater	SOS answered by Mexican Government Station at Tampico. Vessel floated by tugs
January 13 ..	s.s. *Cobequid*, R.M.S.P. Co.	Struck on Trinity Ledges, Bay of Fundy	Wireless brought aid, all saved
January 18 ..	s.s. *Camino*	Hopelessly adrift at sea ..	SOS brought Canadian Government steamer *Lady Laurier* and other vessels to rescue
January 26 ..	s.s. *Washingtonian* ..	Sank after collision with schooner *Elizabeth Palmer* off Delaware Breakwater	Crew in ship's boats reached Fenwick Island Lightship, which sent wireless messages to s.s. *Hamilton*, which took survivors to New York
February 4 ..	s.s. *Colon*	Stranded off bar at Topolobampa	SOS answered by three steamers which saved all on board
February 4 ..	Oil-tanker *Chester* ..	No wireless carried, but attracted *Philadelphia's* attention by sending SOS on Morse lights	*Philadelphia* established communication by this means and rescued 33 persons
February 19 ..	s.s. *Santa Marta* ..	Lost rudder in gale ..	SOS brought necessary aid
March 6 ..	s.s. *La Touraine* ..	On fire 400 miles west of Irish Coast	SOS answered by four vessels, including *Rotterdam*. Latter "stood-by" until fire was controlled
March 18 ..	s.s. *Santa Ana*, Alaska S.S. Co.	Wrecked on Kodiak Island, Alaska	Rescue effected
March 22 ..	s.s. *Denver*		SOS call established com- vessels. Crew all saved munication with eighteen
March 25 ..	s.s. *Parisian* ..	Grounded in Mississippi River. While in this position she was struck on March 27 by s.s. *Heredia*, United Fruit Co.	Wireless brought aid to both vessels. There were 164 passengers on *Heredia*
March 27 ..	s.s. *Heredia*	Struck s.s. *Parisian*	Aid summoned (see above)
March 30 ..	s.s. *Balmes*	Stranded on reef thirty miles west of Key West Naval Wireless Station	Key West Naval Radio Station answered call and sent out salvors
April 1	s.s. *Mexico*, P.S.N. Co.	Ran aground near Southwest Pass, La	Wireless instrumental in bringing tugs to float vessel
April 3	s.s. *Prins Maurits* ..	Lost off Cape Hatteras, N.C.	SOS answered by several near-by vessels; none, however, were able to locate vessel
April 11 ..	s.s. *Minnesota* ..	Ranon reef at entrance to Inland Sea in Japan	SOS answered by *Oanfa*, which stood by until Salvage Company brought assistance

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1915. April 14 ..	s.s. *Seminole* ..	Wrecked off Yuma Bay ..	Wireless utilised but passengers reached shore before rescue arrived
April 21 ..	s.s. *San Zeferino* ..	Grounded in Galveston Harbour	Wireless used to report
April 29 ..	s.s. *Edgar H. Vance*	Disabled by heavy seas 100 miles from San Francisco	Wireless brought aid; vessel towed safely back to port
May 7	s.s. *Asuncion* ..	Ashore off Fraser River ..	Wireless brought tugs
May 7	s.s. *Lusitania* ..	Torpedoed and sunk by German submarine	SOS brought rescue vessels; 764 saved, 1,157 lost
May 18 ..	s.s. *Standard* ..	Fire in fuel bunkers. Lat. 22° 50′ N., long. 88° 18′ W.	Wireless brought three steamers whose crews extinguished fire. *Standard* was towed into port; 39 aboard
May 26 ..	s.s. *Ryndam* ..	Collided with *Joseph J. Cuneo* off Atlantic Coast	Wireless brought two liners and four U.S. battleships, one of which convoyed *Ryndam* to New York
May 28 ..	s.s. *Mackinaw* ..	On fire off San Francisco ..	Wireless brought tugs
May 28 ..	s.s. *Dorchester* ..	Rammed by schooner *J. A. Palmer*, of Annapolis, Md.	Wireless used
May 31 ..	s.s. *Seward*, Alaska S.S. Co.	Wrecked thirty-five miles off Cordova, Alaska	
June 3.. ..	s.s. *Alliance* ..	Ashore Richmond Beach, Wash.	Wireless brought aid
June 9.. ..	s.s. *A. W. Perry*, Plant Line	Wrecked, Chebucts Head, N.S.	SOS brought assistance; 42 passengers and crew saved
June 13 ..	s.s. *Bunker Hill* ..	Collided with s.y. *Vanadis* off Eaton's Neck, Long Island Sound	Wireless established with near-by vessels and shore stations. Two killed and several injured
June 16 ..	s.s. *Alabama* ..	Collided with s.s. *Delaware*, in dense fog	Wireless used to notify owners
June 28 ..	s.s. *California* Anchor Line	Ran ashore at Tory Island	Wireless brought British destroyer to vessel
July 2	s.s. *Panuco* ..	Grounded at entrance to South Pass, La.	Wireless brought aid; 35 aboard
July 10 ..	Pilot boat *New Jersey*	Rammed and sunk by United Fruit Steamer *Marchioneal*	Fruit steamer saved crew, and SOS sent out brought many responses
July 11 ..	s.s. *Invermore* ..	Wrecked near Brig Harbour Labrador	Wireless used and aid obtained
July 22 ..	s.s. *Sucha*	On fire in Gulf of St. Lawrence	SOS answered by *Royal George*, which on reaching *Sucha* found fire put out
August 2 ..	s.s. *Georgian* ..	Ashore near San Francisco in fog	Wireless used. No lives lost
August 4 ..	*Emma Angel* ..	Storm battered and waterlogged, forty-five miles south-east of Highlands	*Emma Angel* signalled s.s. *Bermudian*, which wirelessed U.S. Revenue Cutter *Seneca*, and all aboard saved
August 18 ..	s.s. *El Sud*	Stranded on Galveston Jetties during hurricane	Wireless brought assistance. Vessel towed into Galveston Harbour
August 23 ..	s.s. *Metapan* ..	Grounded Cartagena Harbour	Cargo discharged into lighters and steamer floated; 45 passengers, 19 crew
August 31 ..	s.s. *Edith*, Alaska S.S. Co.	Abandoned forty miles north-east Cape St. Elias	SOS brought aid, all saved
September 13..	s.s. *Sant Anna*, Fabre Line	On fire in mid-ocean, Lat. 40° 23′ N., long. 47° 30′ W.	SOS brought *Ancona*, which took off 600 out of the 1,700 persons on board, and convoyed distressed vessel to port
September 19..	s.s. *Athinai* ..	Destroyed by fire and abandoned in latitude 40° 54′ N., longitude 58° 47′ W.	SOS brought *Tuscania* and *Roumanian Prince*, which rescued passengers and crew, numbering 470 persons.

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1915. October 8 ..	s.s. *Mariposa*, Alaskan S.S. Co.	Ran aground in inner passage between Queen Charlotte and Milbank Sounds	Wireless brought s.s. *Despatch*, which took off passengers
November 1 ..	s.s. *Rochambeau* ..	On fire	SOS answered by many vessels. Fire got under control
November 2 ..	s.s. *Santa Clara* ..	Wrecked near entrance to Coos Bay, 170 miles south of Astoria	Wireless brought assistance, 15 passengers, 24 crew drowned. 93 saved
November 5 ..	s.s. *Fort Bragg* ..	Grounded in Gulf of California	U.S.S. *San Diego* responded to wireless and 47 saved
November 9 ..	s.s. *Lievatta* (Italian)	Loaded with cased kerosene and gasolene on fire, 65 miles off Sabine Bar, Texas	Reported by wireless by s.s. *Gulfstream*, which "stood-by" until other assistance arrived from Port Arthur and Galveston
December 1 ..	s.s. *Flamenco* ..	Ran aground at South Pass, La.	Disaster reported
December 1 ..	s.s. *Minnesota* ..	Machinery disabled 760 miles south of San Francisco	Wireless brought s.s. *Iroquois* and tug *Dauntless*
December 5 ..	s.s. *Petrolite* ..	Shelled by submarine in Eastern Mediterranean	SOS brought American battleship
December 10 ..	s.s. *Shabenee* ..	Propeller broke off Newfoundland	SOS brought s.s. *Muskogee*, and vessel towed into St Johns
December 13 ..	s.s. *Antilla*	Collided with barge, beached off Sea Gate	Wireless used; cargo saved
December 22 ..	s.s. *Thessaloniki* ..	West of Azores with engine-room flooded by heavy seas	SOS answered by s.s. *Stampalia*, which "stood-by" until *Thessaloniki's* pumps worked again
December 28 ..	s.s. *Thessaloniki* ..	Again in distress	SOS answered by three vessels; s.s. *Patris* took off her 215 passengers. Crew of 90 rescued by s.s. *Perugia* several days later
1916. January 1 ..	s.s. *Vandeggen* ..	Disabled. Not equipped with wireless; attracted notice of s.s. *Muskogee*	Message sent broadcast giving position and steamer towed to port
January 17 ..	Car Ferry *Pere Marquette* 19	Aground four miles north of Ludington, 7.40 p.m.	Wireless established and vessel salved
January 19 ..	s.s. *Pollentia* ..	Sinking 706 miles off Cape Race in lat. 36° 30′, long. 35° 04′	SOS answered by five vessels. The crew of 35 were rescued by *Guiseppe Verdi*, while *Narragansett* poured oil on waves
January 22 ..	s.s. *Centralia* ..	Heavy seas washed away deck load, broke rudder, flooded engine-room off Columbia River	SOS answered by five steamers and two land-stations. Weather having improved the ship reached San Francisco safely without assistance
January 23 ..	s.s. *Brazos* and s.s. *Suffolk*	In collision near the Scotland Light in dense fog	SOS informed agents, who instructed the vessels to return to New York
January 24 ..	s.s. *Frank H. Buck*	Lost rudder 355 miles north San Francisco	Wireless brought aid
January 26 ..	s.s. *Proteus* ..	Collided with steamer *Brabant* below Narrows, New York Harbour	Agents of both vessels informed
January 30 ..	s.s. *Philadelphia* ..	Collided with sailing ship *Ben Lee*, twelve miles south of Carnarvon Bay	Wireless notified agents of accident
February 1 ..	s.s. *Takata Maru* ..	Collided with s.s. *Silver Shell*	Marconi Stations at Boston and Cape Race, also various steamers answered SOS. Crew rescued by *Silver Shell*
February 4 ..	s.s. *Texas* (Swedish)	Cargo of cotton on fire ..	Wireless first reported fire; then advised assistance not required

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916. February 4 ..	s.s. *Howard*.. ..	Collided with barge off Point Judith	Wireless notified owners of accident
February 7 ..	s.s. *Harvard* ..	Rammed schooner *Excelsior* in San Francisco Bay	Wireless brought immediate assistance from shore
February 15 ..	s.s. *Pavlof*	Lost propeller and stranded on Tugidak Island, Alaska	Communication estabished with Naval Radio Station at Dutch Harbour and naval station at Kodiak; s.s. *Alameda* stood by until vessel was abandoned on reef
February 21 ..	s.s. *Middlesex* ..	Ashore inside Cross Rip ..	Captain of s.s. *Nacooche* learned plight by Morse lamp and summoned assistance by wireless
February 24 ..	s.s. *Cretan*	Struck by s.s. *Dorothy* three miles south-east Wimble Shoal Buoy	SOS answered by several ships. *San Jacinto* nearest and did most of work. Communication with Marconi Stations at Cape Hatteras and Virginia Beach maintained throughout
February 29 ..	s.s. *Multmomah* ..	Struck Viti Rock off Lummi Island in heavy fog	Marconi Station at Seattle received call and reported accident
February 24 ..	s.s. *Polarine* ..	Went ashore on 23rd, near Helsingborg	SOS brought s.s. *Pioneer* from Copenhagen
March 4 ..	s.s. *Apache* ..	Machinery disabled forty-five miles south of Cape Henry, and anchored in twenty-five fathoms	SOS brought wrecking-tugs which towed her to port
March 5 ..	s.s. *Principe de Asturias*	Foundered off Ponta Boi, near Santos	SOS brought s.s. *Vega*, which rescued many of the 1,000 passengers and crew; 338 passengers, 86 crew lost
March 14 ..	s.s. *Kanawba* ..	Sprang a leak and sank off the coast of South Carolina	s.s. *Santa Marta* picked up 21 of crew and notified other steamers by wireless to search for other boat, containing seven of crew
March 16 ..	s.s. *Zealandia*, Fiske Trading Co.	Steering gear disabled 300 miles off Sandy Hook	SOS relayed to Marconi Station at Miami by Standard Oil Co's *Richmond*, and assistance sent
March 16 ..	s.s. *San Onofre* ..	Ran short of coal during blizzard off Newfoundland Coast	SOS brought s.s. *Ashtabula* which towed vessel to Halifax
March 16 ..	s.s. *Macona*.. ..	Ashore Barbuda Island, B.W.I.	Owners notified. Tugs sent
March 16 ..	s.s. *Cubantia* ..	Sunk by mine or torpedo near Noordhinder Lightship	SOS first picked up at Hook of Holland. Dutch torpedo boat and lifeboats rescued all on board
March 21 ..	s.s. *Bradford*, leaving San Francisco	Accident to rudder ..	Communication established with Marconi San Francisco Station; tugs sent
March 22 ..	s.s. *Minneapolis* ..	Sunk by submarine in the Mediterranean	SOS brought *Leicestershire* and other vessels
March 23 ..	*Svaland*	Dismasted in lat. 44° N., long. 55° 30′ W.	Reported by Swedish s.s. *Murjek*, and tug demanded
March 23 ..	s.s. *Alamo*	Engine disabled, also broken rudder, 130 miles north-east of Cape Hatteras	SOS brought wrecking tug from Norfolk
March 29 ..	British Cruiser, 59 *M*	In distress in Irish Sea ..	SOS call received by s.s. *Siberia*, which radiated general distress call, bringing British Destroyer to his assistance
March 31 ..	s.s. *Chiyo Maru* ..	Grounded in fog on Lema Islands	SOS brought nine tug-boats and launches, and British torpedo boat destroyer rescuing 299 passengers

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916. April 2.. ..	s.s. *Enterprise* ..	Broke main shaft and damaged stern	Wireless communication established with steamer *Manoa* 150 miles away. *Manoa* took *Enterprise* in tow
April 5 ..	s.s. *Patria*, Fabre Line	In distress in Mediterranean	Radiated call which was answered by s.s. *Siberia*
April 6.. ..	s.s. *Zent*, Elders and Fyffes	Torpedoed without warning at Fastnet	SOS brought assistance and part of crew saved
April 8.. ..	s.s. *Madison*, Old Dominion Line	Standing by two barges off Long Branch, N.J., flying distress signals, 6.15 p.m.	Five men rescued from barge and transferred to Coastguard Cutter *Mohawk*, from New York, which completed rescue
April 8.. ..	Schooner *Emma E. Angell*	Lat. 37° 43′, long. 75′ 08′, sunk in collision with steamer *Chepstow Castle*	*Chepstow Castle* rescued crew. Accident reported by radio
April 9.. ..	s.s. *Guajara* ..	Badly disabled 301 miles south of Scotland Light	SOS brought s.s. *Sixaola*, which towed liner to Norfolk
April 10 ..	Steamer *San Ramon*	Pacific Coast; lost propeller at 3.30 a.m.	Wireless through Marconi Station, San Francisco, brought tugs
April 15 ..	Schooner *Wm. P. Hood*	Reported in distress fifty-seven miles south-west of Five Fathom Bank Lightship by steamer *Jamestown*	SOS brought Revenue Cutter *Mohawk*
April 15 ..	Schooner *Mary F. Morse*	In distress off Hatteras ..	s.s. *Lenape* "standing by" schooner notified Norfolk Station, which sent tugs
April 18 ..	Schooner *Millie R. Frank*	Seen in distress by s.s. *Madison*, which wirelessed call	Coastguard Cutter *Mohawk* rendered assistance. Crew rescued by Toms River coastguard
May 8	s.s. *Philadelphian* ..	Collided with Fire Island Lightship	Communicated with Marconi Station at Sea Gate. Revenue Cutter despatched to help
May 9	Fire Island Lightship	Rammed by s.s. *Philadelphian* in dense fog	SOS responded to by Coastguard cutter *Mohawk*. Lightship taken in tow by *Philadelphian* and brought to port
May 9	s.s. *Roanoke*, North Pacific S.S. Co.	Foundered and sunk during daylight hours	Steamer *Edgar Vance* picked up two boats and notified Shore Stations of disaster. Six survivors, 48 lost
May 11 ..	Barge *Ivie*, New England Coal and Coke Co.	Rammed and sunk in Hampton Road by steamer *Berkshire*	Owners notified by radio. Crew of barge rescued by steamer
May 14 ..	s.s. *Kandahar* ..	On fire in Ambrose Channel	Facts reported to agent, who sent fire boat from New York
May 15 ..	s.s. *San Giovanni* ..	In collision with s.s. *Grekland* in fog, in Ambrose Channel, near Sandy Hook	*San Giovanni* established communication with Marconi Station at Sea Gate. Three vessels afforded assistance
May 19 ..	s.s. *Catania* ..	Went ashore during heavy weather at Aransas, Pass Bar, Texas	SOS answered by Marconi Station at Galveston, which sent tug, which towed her to Aransas Docks
June 14 ..	s.s. *Bear*, San Francisco and Portland S.S. Co.	Wrecked in dense fog off Cape Mendocino during evening	SOS brought three steamers and tug. Five lives were lost in transfer, while 200 were saved.
June 24 ..	s.s. *Fernando Po* ..	Stranded near Black Rock Light	SOS brought U.S.S. *Pathfinder;* and crew, passengers and mails taken off
September 13..	s.s. *Antwerpen* (Dutch)	Torpedoed and sunk near England	SOS brought assistance to rescue of crew

Date.	Name of Vessel.	Nature of Disaster.	Part Played by Wireless.
1916. September 14..	s.s. *Congress, en route* San Francisco to Seattle	Fire in hold and beyond control	*Congress* sent SOS which was picked up by Marconi Station at Eureka, Cal. Communication established with Marconi Station, Marshfield Harbour, and several vessels rushed to assistance. All rescued
September 23..	s.s. *Bay State* ..	Went ashore on rocks off Cape Elizabeth, Maine	SOS established communication with Naval Station at Cape Elizabeth. Revenue Cutter *Ossipee* proceeded to wreck. Agents notified and sent tugs. All rescued
October 7 ..	s.s. *Antilla,* Ward Line	On fire off Virginia Capes..	SOS brought s.s. *Somerset,* which saved all
October 8 ..	s.s. *Stephano,* s.s. *West Point,* and s.s. *Christian Knudsen*	Torpedoed and sunk by German submarine off Nantucket Lightship	SOS brought U.S. Navy ships *Jenkins* and *Balch,* which rescued all

SOME FEATURES OF THE LONG DISTANCE STATIONS OF THE AMERICAN MARCONI COMPANY

By C. H. Taylor.

WHILST the progress of wireless in the territories, colonies and dominions of the Entente Allies, though wonderful to a degree, cannot be discussed in print, that of America stands out for all the world to see. Especially is this the case with the erection and opening of long distance stations. The high power installations erected in New Jersey and Massachusetts by the Marconi's Wireless Telegraph Company of America, for the purpose of long distance communication with the United Kingdom and Norway respectively, afford excellent examples of this activity. There are other important items in the Marconi programme into which it is not necessary for our present purpose to enter; but in view of the recent opening of the extension of the Marconi Pacific Service to Japan, it may be of interest to those who devote some attention to radio-telegraphic matters to have, as here set forth, an account of these important and up-to-date installations.

The general design of these stations was decided upon in the spring of 1912, and there was—so far as the radio equipment is concerned—no important modification made subsequently when the material was fabricated. Broadly speaking these stations, from a radio point, are members of an organised system designed for long distance communication throughout the world.

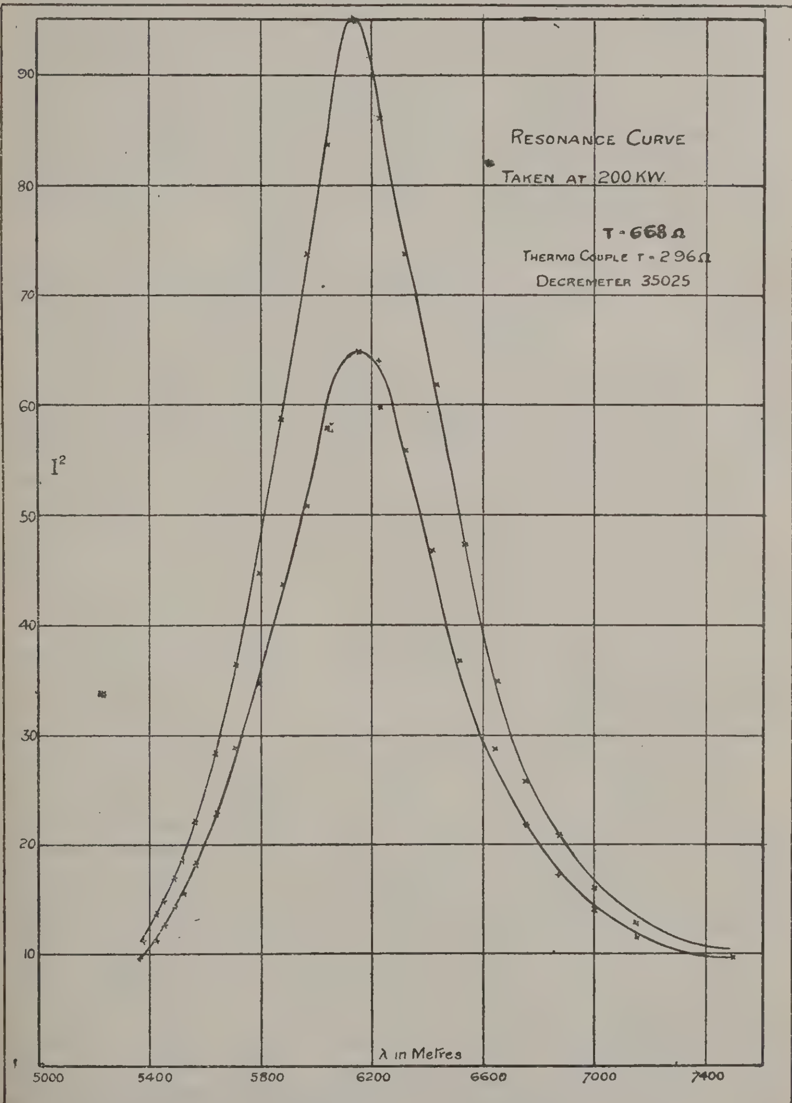
It can be readily seen that a group of powerful long distance stations can be operated most effectively if all members of the group are designed not as isolated units but as component parts of one large group. This is the procedure that has been adopted, and the wave-lengths and spark-frequencies assigned to each of the various units were considered with greater reference to the complete group than to the individual circuit.

It is not our present intention to describe the power-supply equipment of these stations, as the points of greatest interest will be (*a*) those relating to the methods adopted to utilise effectively for radio work the primary power with which these station are equipped, and (*b*) those relating to the success of these methods.

In the primary-power circuit the equipment at all these stations is similar. The unit for the supply of power to the radio circuits has a full load rating of 300 kw. An illustration showing a typical instance will be seen facing page 320. It is in every case directly connected to the prime mover—either a steam turbine taking steam from their own steam mains; or a motor, taking power from public service mains. The various accessory machines are driven from the same source of power, and are standard machines that call for no comment here.

These 300 kw. alternators possess special features of their own. The frequency is, from a power-station point of view, high; and varies for each station. This was deliberately arranged for, in order to assist in the selectivity at the receiving station. It was considered that it might not be possible to operate all the many proposed long-distance stations without some interference with each other, so the radio and audio frequencies are both varied with each station. The point of

most interest about these alternators is that the stators of these machines are not fixed rigidly to the frames. The stator unit sits on a bearing inside the frame and is capable of being rotated thereon. The arc through which it turns is large enough to allow its position relative to that of the rotor to be changed through an amount at least equal to the



Resonance Chart, *See page* 728.

pole arc. These adjustments are made by means of a small hand wheel fastened rigidly to a threaded spindle. This spindle engages with a lug on the stator unit, and as the hand wheel is rotated, the stator is turned in relation to the rotor. A split collar and pinching screw are sufficient to hold this spindle in any desired position

This type of construction was adopted because it was decided to drive the discharger through an extension of the rotor shaft and it was necessary to provide means for the control of the sparking instant. By the construction outlined above it is possible to make the alternator potential maximum occur at any desired position of the rotor shaft. The adjustment provided on the stator of the alternator is sufficient to allow the potential of the machine to be varied from O to its positive or its negative maximum for the instant when the rotating studs on the discharger successively enter the spark zone. The correct position for the stator with relation to the beginning of each condenser discharge must be ascertained for each wave change as this position appears to vary with the make up of the primary radio circuit.

In practice these adjustments are not difficult. The circuit is loaded, and the power input held constant while the stator is turned until the reading on the wattless component meter is a minimum and that on the thermoammeter in the antenna circuit is a maximum. It has been found that the setting done at the power house can be very accurate. Tests have been carried out over the long distance circuit to ascertain what error was liable to creep in by leaving this adjustment entirely in the hands of the transmitting station with the result that the receiving station audibility curve confirmed the transmitting station's adjustment.

Four resonance transformers each of 75 kva. rating raise the voltage at which the power is received from the alternator from 2,000 to a higher voltage at which it is more conveniently used in the primary radio circuit.

An interesting paper on the circuit has already been presented to the Institute of Radio Engineers by Mr. Hallborg, and for this section of the work readers are referred to his paper, which figures in the printed proceedings of the Institute. An example of a resonance curve will be found on previous page.

The other feature of interest in this low frequency circuit is the operating control switch.

The control of the radio circuits for operating purposes has been placed in the condenser feeding circuit. This position has stood the test of exhaustive trials and is in common use at all Marconi power stations.

These switches make and break the circuit through which the charging current flows into the condenser bank. One of these switches is inserted in each line so that there is a complete break between the condenser and the feeding circuit. Each switch puts two breaks into the line that it controls. These switch keys are of the moving coil type operated by means of a change in the direction of the current flowing through one of the two sets of windings. Normally, the direction of the currents in the two groups of windings is such as to hold the switch arm in that position which makes a break in the high tension feeding line. When the direction of the current in one of these two groups of coils is changed, the switch arm moves over until it makes contact with a stationary contact holder ; the high tension line is thus closed, and the

current can then flow into the condenser bank and charge it. The distance through which these moving arms swing depends upon the rate at which operation is to be carried out.

Since the gap opened in this circuit is small and the voltage of the interrupted circuit is high, an arc will follow the break here every time the high tension circuit is interrupted. If this were allowed to persist, the signals would be distorted and rendered unintelligible. Consequently an air blast is played upon these contacts and the arc that follows each interruption is blown out.

In order that high speeds may be possible with these keys, the moving parts are made very light, yet sufficiently strong to withstand the tremendous hammering that they must endure when being operated at a good telegraph speed. The present type of key is the result of several successive eliminations of varieties that have been shown to have some defect, after being put through the severe test of commercial operation over an extended period.

With this key it is possible to operate cleanly at speeds of 75 words per minute, and the key has been tested up to a speed of 100 words per minute, without distortion of the signals.

The primary oscillation circuit naturally divides itself into three groups—the condenser bank and its connections, the coupling coil, and the discharger.

The units of this condenser are made up of thin sheets of zinc suspended in stoneware containers filled with insulating oil. Between each pair of zinc sheets is stood a glass plate approximately $\frac{1}{8}$ inch thick. This type of condenser has proved in practice to have losses that are less than those developed in that type which has the conducting sheet pasted on to the glass plate.

The oil used in these tanks was carefully chosen and was forced through a filter press before being passed into the containers. An interesting fact has recently developed in connection with the oils used in condensers of this type. It has been found that condensers built in this fashion have, at certain stations, modified the characteristics of the oil during service, Units taken out of service after about a year's work have shown a fairly hard desposit on the surface of the glass. This deposit, which is yellow in colour, does not come away from the surface at all easily ; in fact, it seems to get pressed tightly into it. In some instances when this has been removed from the glass the surface shows a clearly defined outline where the edges of the zinc sheet rested. Other instances have been reported in which this change in the oil is only one of thickening, in which the oil becomes changed to the consistency of vaseline. The oil has not been purchased from the same firm in all such cases, but has been bought in widely separated localities, so that it cannot be attributed to any one particular grade of oil. At present this oil change has not been noticed in the tanks that are known to have been supplied with oil forced through the filter press, so it is very probably due to traces of water in the oil.

As the spark frequency adopted at these stations is low, the energy per spark is correspondingly high. In order to avoid excessive potentials in the primary circuit, the value of the capacity has been kept large. In consequence, the condenser bank covers a rather large area, which has necessitated the careful design of the condenser buses and the arrangement of the tanks.

It is found absolutely necessary to have the buses and the tanks arranged so that they form an electrically symmetrical circuit. For convenience in operating, we have divided up the bank into a number of small groups, each of which is fed and discharged by a separate bus. Each of these group buses is of the same length, shape and relative space location, and these sets are joined to the main bus in as symmetrical a manner as possible, so that this bus will have a minimum disturbing effect on these units.

Moreover, practical experience shows it to be of the utmost importance that the value of the capacity connected to each of these group buses should be identical. If this be not the case, any out-of-balance effect is at once made noticeable by surges which break down the air insulation between the buses, or which may break down the air-gap between the two halves of the condenser group bus. Instances of this splashing have occurred at points where, so far as can be seen, good balance is maintained, and investigation has disclosed the fact that there may exist along the tank bus potential differences at points that were to all appearances identical with respect to the electrical circuit.

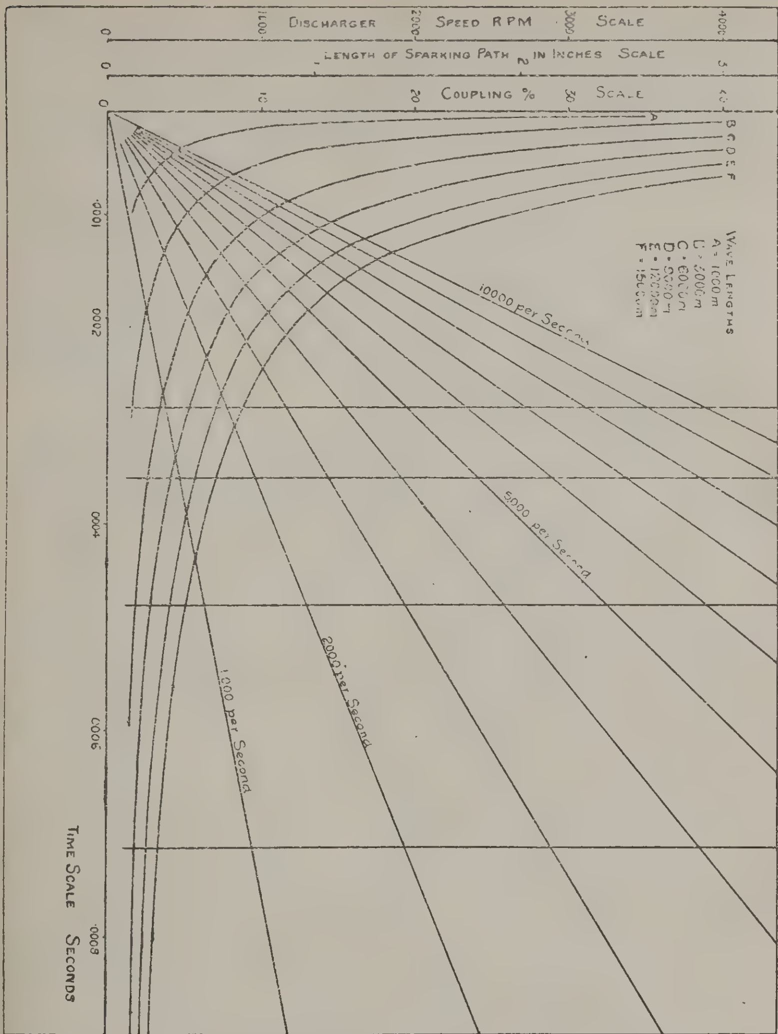
In order to carry without much loss the heavy maxima currents, which occur on the discharge through the spark gap of this condenser, the main buses are each made of copper strip 24 inches wide and $\frac{1}{8}$ inch thick. These two halves of the bus are set up close together, parallel to one another, and separated by an air-space which can be varied between limits. In this manner the inductance of these buses is reduced as much as possible.

In these stations the coupling coil is quite a massive affair. The primary coil, which has the larger diameter, is held stationary, and the secondary is mounted on a frame that allows it to be moved relatively to the primary, in order that the coupling between these two circuits may be varied. Our illustration facing page 320 will give a very fair idea of the arrangement. Each primary turn has a mean diameter of 5 feet, the external diameter over the winding being slightly more than 6 feet. Each of these turns comprises a number of cables laid around a non-conducting core—in this case of wood—which has a circular cross-section 12 inches in diameter. Each cable comprises 7 copper wires each separately insulated by a double cotton covering. The winding is laid around the core in a spiral fashion so that each cable makes at least one turn across the core while it is laid around the ring. In this manner all these wires are kept the same length between the ends of each turn; and each wire is electrically identical, ensuring, as far as possible, an equal current distribution throughout these cables.

The number of the above-mentioned primary turns varies at these stations from two to four.

The condenser is discharged by the well-known Marconi rotary disc type of discharger, built on a large scale, so as to enable it to handle the very large currents employed at these stations. The disc of this machine is 50 inches in diameter.* It is made of high tensile steel, and must undergo a test run for one hour at 3000 RPM before being accepted. In station practice it is seldom run over 2500 RPM. The electrodes fitted to this disc are copper studs having a cross section of 3 by 1 inches, the latter being the section in the direction of motion. The width of the side electrodes can be varied between the limits $\frac{3}{4}$ and $1\frac{1}{2}$ inches.

* An illustration will be found facing page 224.



Sparking Time, Wave-length, and Coupling.
See page 732.

With this type of machine, the discharge of the large condenser may be controlled so that at a reasonably loose coupling the energy may be efficiently transferred to the secondary circuit, and the radiation from that secondary circuit may be confined practically to a single wave length. In order to attain this end, it is necessary to proportion the sparking zone so that the duration of the spark and the time required to transfer the energy at the coupling used are in agreement. With these

machines it is not very easy to gauge with absolute accuracy the length of the spark zone. The position of the stud at the beginning of the discharge can be ascertained from the known potential maximum, the dimension of the electrodes and the size of the gaps between the stationary and rotating members. This is held to the minimum needed to give mechanical clearance when all the parts have reached their steady working temperature. In general it will be of the order of 4/1000 inch in each gap. The position of the stud at the end of the discharge is not so definitely located. Since the speed of the machine is fixed, being determined by the alternator speed, any change in the duration of the discharge must be effected by alterations to the studs, or to the electrodes, or to both. Small variations can best be carried out by changes to the width of the electrodes. Tables and curves can be drawn up (see pages 731 and 733) showing the relations between the coupling, the number of oscillations for various wave lengths per unit of time, and the stud velocity. The size of the studs and of the electrodes in the direction of motion can be ascertained from them.

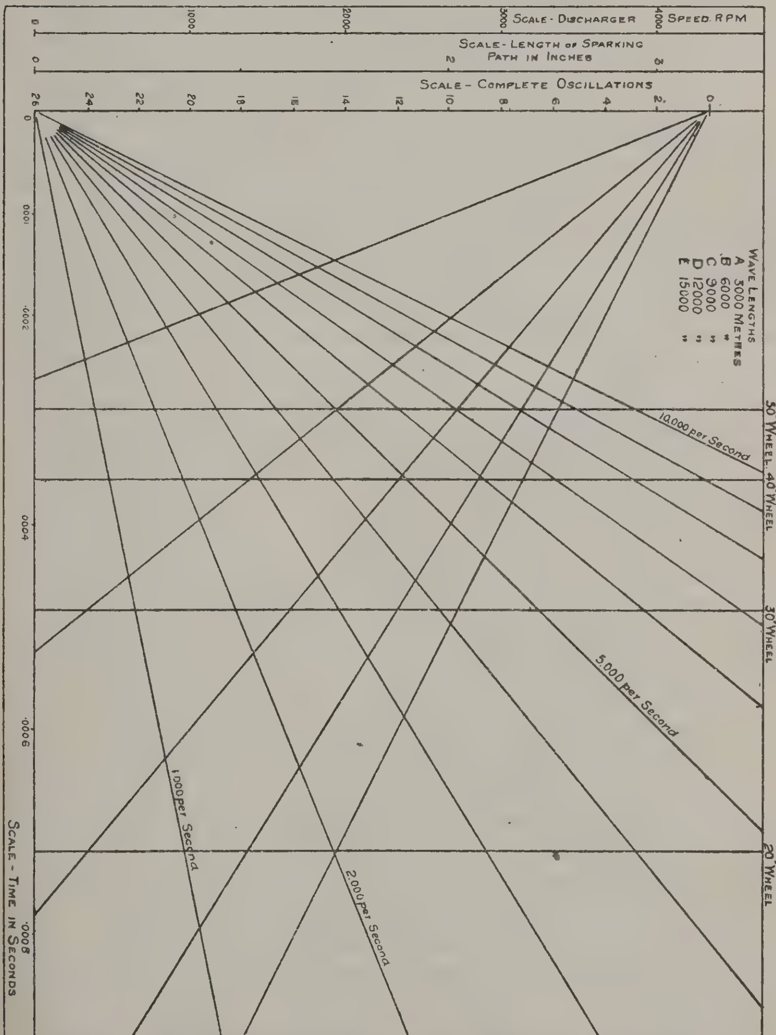
The length of the stud at right angles to the direction of motion of the disc is determined by the current capacity of the circuit with which it is to be used, and the side electrodes are built to conform to the dimensions of the stud. The density of the current per inch of sparking surface on these studs should be kept low. From observations made under operating conditions it would appear that one can go beyond the useful maxima that disc studs will handle.

The inductances forming the secondary coil of the coupler, and the loading for the antenna circuit, are built of wire stranded in a manner similar to that described for the primary coil of the coupler. As this wire must be flexible, and as the current maximum is not so great, the amount of copper in this cable is reduced. The cable comprises a number of 7 strand cables laid around a jute core $2\frac{1}{2}$ inches in diameter. Each of the wires of these 7 strand cables is insulated with a double covering of cotton, and the cables spiral around the jute core. A covering of coarse black braid binds the whole group together. Cable of this type is invariably employed in the antenna circuit between the leading-out insulator and the ground connection.

The type of antenna circuit adopted by the Marconi Company is very familiar. The illustration facing page 304 gives a very fair idea of the general arrangement. Advantage is taken of the directive properties of the inverted L type of antenna both with regard to the adjacent receiving stations, as well as to the distant receiving stations. These antennæ are set with their major axes along the line of the true direction of the distant receiving stations. The general dimensions of the circuit depend upon the wave length to be employed.

As the stations we are dealing with were designed to be operated on damped wave trains, and with tone reception; attention had to be given to the dimensions of these circuits, so that the emitted wave trains might have a low decrement, and so that the most might be made of tuning and selectivity at the distant receiving stations. A compromise had to be effected between the antagonistic claims of low decrement and radiation efficiency. The resistance losses of the various parts of the antenna circuit were brought to as low a value as possible. In order to minimise the losses in the gound portion of this circuit the usual group of earth plates were supplemented by a second group.

placed under the antenna near the first row of masts, and wires were carried out from the main group of earth plates under the antenna until they reached beyond the last row of masts. These wires were distributed over the surface of the ground in a manner coresponding with the wires in the antenna. In this way the soil of the ground around the station and under the antenna was not entirely depended upon to carry the currents in this circuit. Wires were also extended



Sparking Time, Wave-length, and Complete Oscillations. *See page* 732.

from the power house, in the opposite direction to that of the antenna, in order to minimise the losses in this portion of the circuit.

As will be plainly evident, it is easily possible to make the decrement too low for the other constants of the installation. By this we mean that continuous decreasing of the decrement will bring us to a value at which the antenna circuit has just ceased emitting one wave-train when it is called upon to absorb energy for the next wave-train. A further decrease will bring us to the state in which the antenna has not completed one wave-train before the energy for the next is thrust upon it. Such a decrement as this would be too low for a circuit operated as these are, unless there were complete phase harmony between successive wave-trains. As an instance of this we may point to the New Brunswick station. It has a spark frequency of 240, and may be using a wave length of 15,000 meters. Eighty of these oscillations would completely fill the time interval between two successive sparks. Now we must subtract from the complete time interval, the period required to transfer the energy from the primary to the secondary circuit, so that only sixty-eight complete oscillations in the decreasing portion of each wave-train as it left the transmitting station could be allowed. Any lessening of the decrement, that will permit of more than this number of complete oscillations after the antenna is left freely vibrating, will not be of advantage unless the successive wave trains are in correct phase with each other. On the other hand, any increase in the decrement to give a useful clearance between wave trains might involve a breach of the Góvernment regulations. Even the effect of overlapping wave-trains, when they are not in correct phase relation, may give the station an apparent decrement that is higher than the real one for the circuit.

It will thus be seen that, so far as the antenna circuit decrement at the transmitting station is concerned, all the demands of the receiving station are not possible of fulfilment. That station would like a very low decrement to the received wave train and a high spark frequency.

In connection with these big antennæ; and in fact, with any antenna that is to be used for continuous commercial work, the atmospheric conditions at and around the station must be taken into consideration in the design. For instance, around New York and north of that city along the Atlantic coast one must expect to experience each winter high winds, snow and sleet storms. Consequently the antenna must be designed to withstand the most adverse of these conditions. Gales can be guarded against without much extra work, but the most severe test is that arising from a combination of snow or ice sleet and wind. If the atmospheric conditions are such as to favour the formation of ice upon the exposed wires of the aerial system; and if, after this has gone on until a cylinder of ice of appreciable diameter has been built around the wires, a wind of moderate velocity starts to blow there will be great danger that some of the antenna wires will break under the increased load. Practical experience has shown that the best method to overcome this trouble is to melt the ice as fast as it is formed. To enable this to be done the antenna wires are grouped together in pairs which run as a loop from the power house to the free end of the antenna and back to the power house, the open ends being at the power house. For normal radio work all these loops end at the power house, and are joined together to a common bus; but in case of necessity they can be cut off from the bus, and each loop (either singly or in groups) can be

joined to a suitable 60 cycle circuit, and sufficient current passed through these loops to raise the temperature of each and melt the ice cylinder. At the station in New Jersey an occasion to test out this heating scheme during the early part of 1915 occurred, and it was found that it required 100 amperes per loop to do the work at a reasonable speed. When using this amount of current on wires that were very heavily coated with ice, the effect was apparent within two minutes. The coating of ice had then been melted so that it began to break away, and the loop was quite clear in seven minutes. It is needless to remark that care must be exercised that the current put into the loop is not sufficient to soften and weaken the wire. Treating the antenna wires in this manner interrupts the service for a few minutes, but avoids a possible interruption of some hours.

Another point of interest is the distribution of the current from the foot of the antenna to the grounding system. At these stations the main grounding system comprises two semicircles of metal plates sunk one on the side of the power house nearest to and one on the side opposite to the aerial system. The wires fan out to these plates from the leading out insulators, set in both of these faces of the building, and on that side which is towards the aerial system, the connections to the wires that are laid under the antenna are made over these same wires. Within the power house these two insulators are connected by a copper bus or a length of high frequency cable. At the medial point of this bus the connection to the coupling coil is made, and on either side of this junction a thermal-ammeter is inserted into the bus. In this manner we can see at a glance the values of the current flowing out of the building to each of the two sets of earth plates. These sets of plates are metallically connected together so that the complete ground plate possesses the appearance of a very short cylinder with semicircular ends. It is found that the distribution of the current is not at all equal; the larger proportion flows out on that line that leads directly toward the antenna and the smaller proportion flows out in the opposite direction. This proportion may be as high as 2 to 1 and may vary with the load.

At these long distance stations particular attention has been paid to the receiving end of the circuit. In the early days of commercial radio work the reception was invariably carried out on the same antenna as that used for transmission. This meant that the design of the antenna was treated more with a view to getting good radiation, and the reception had to take care of itself. This was not objectionable so long as very small powers were being used for transmission, but as soon as larger powers were brought into use it was found more expedient to use a separate wire for reception. Although this is an improvement, yet, since the wire is suspended from the same masts as the transmitting wires, the receiving wire is still influenced by the proximity of these other wires, and the response to the incoming signal is not so good as when the receiving wire is suspended from masts with no other antenna connected to them. This pointed the way to a complete separation of the two functions of these stations, whenever there would be a circuit that had sufficient business to justify the increased expense. At such a station, only considerations affecting the reception of the signals would be entertained, and the antenna would be designed for this separate function.

At these long distance stations this separation has been made, and

in consequence each of the two functions of a radio station can be carried on simultaneously—that is to say, the transmitting station can send messages continuously, and the receiving station can receive messages continuously, during the same time over the same circuit.

Advantage was taken of the directive property of the inverted L antenna at these receiving stations. These are located, with respect to the distant and nearby transmitting stations, so that their receptivity was a maximum for the distant station and a minimum for the adjacent one. In order to annul the effect of the adjacent station a compensating antenna is added, also of the inverted L type, and so located that it has its maximum receptivity in the direction of the adjacent station and its minimum in the direction of that of the distant one. By this means the effect of the distant transmitting station can be left unimpaired while that of the adjacent station is reduced to a negligible quantity.

Since the reception is carried on at some point at a distance from the transmitting station, it is found expedient to arrange that the radio operation of the transmitting station be controlled from this same point. This is not a very hard problem. The switch keys that control the condenser circuit are operated through a polarised relay which is inserted in an ordinary land line circuit erected between the two stations. The operator at the receiving station works a land line key, and energises this relay, which, in turn, operates the switch keys and thus controls the radio transmission.

The receiver designed for these stations is of the usual type, with loose coupled circuits built with especial reference to the long waves that were to be employed at these stations. It can be used with both the crystal and the valve detector.

In addition to this, special arrangements permit of the amplification of the incoming signal, so that it could be recorded on a dictagraph cylinder. This record would be made whenever the volume of business necessitated more rapid operation than could be done by hand and ear.

For the operation of this circuit automatically there was installed Wheatstone apparatus with the necessary perforators. Signals sent at a high speed were amplified and recorded on the dictagraph cylinder and transferred from that cylinder by an operator working at a good manual speed. In this manner the circuit would be able to be operated at a speed of from 75 to 100 words per minute.

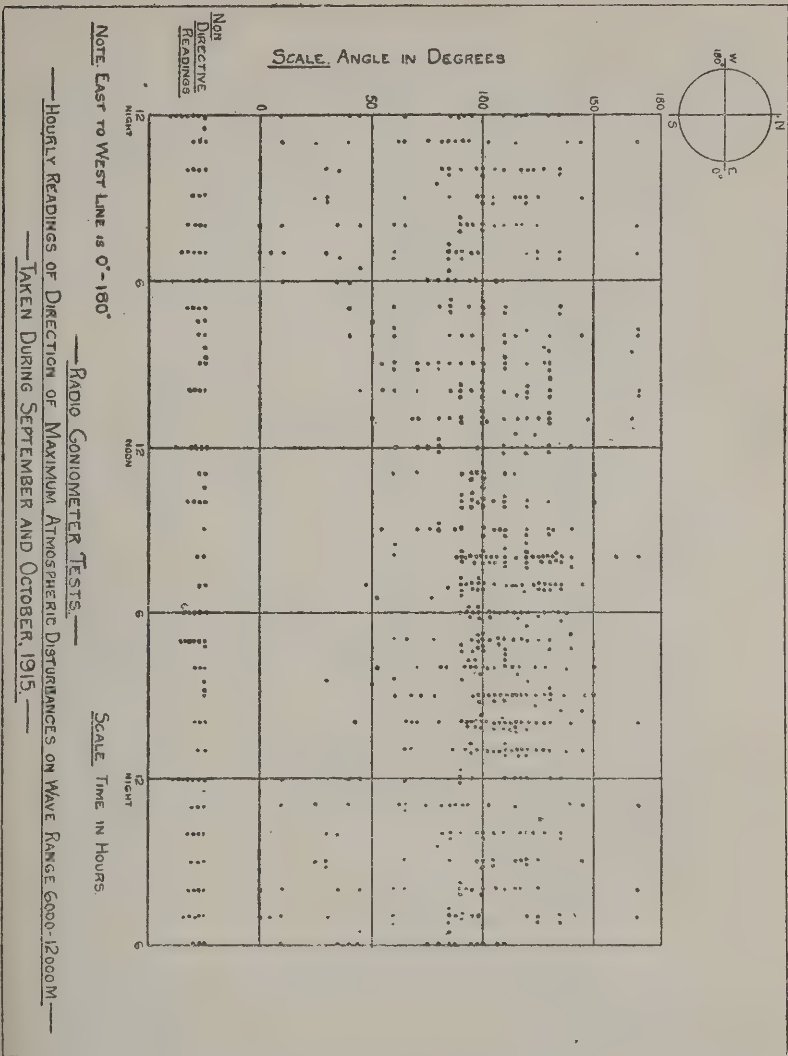
One advantage that is gained by the separation of the receiving from the transmitting function of these stations is the ability to " break" the operator transmitting. In this there is a great saving of time, and it is found that traffic is moved forward at an appreciably higher rate of speed than when the same stations are not able to work this " break."

It has been found that these independent receiving stations possess very good receptivity, and, in consequence, were rather bothered by the usual atmospheric disturbances and by interference from stations in the vicinity, although these were using much shorter wave-lengths. Some tests were carried out on the comparative receptiveness of wires of shorter length than those proposed for these stations, all wires being suspended at approximately the same height above the earth's surface. It was found that, when shorter wires were used, it was not till the natural of the antenna was increased until it was approximately equal to that of the standard long-wire antenna, did the signals on this antenna attain

COMMANDER D. W. TODD, U.S.N., DIRECTOR OF NAVAL COMMUNICATIONS OF THE UNITED STATES.

(For whose Biographical Notice see page 895.)

[*To face page* 736.



Radio-Goniometer Tests. *See page* 738.

the same audibility as those on the long wire. Tests were also made on wires suspended from 50 to 30 feet above the ground ; these gave signals of less audibility than the standard wire, even when the quantity of wire in each antenna was approximately the same.

In both of the above variations in the antenna make-up, the atmospheric disturbance troubles were decreased, but this diminution was only in the same order of proportion as that of the signal, and there did

not appear to be any corresponding advantage that would compensate for the weaker signal.

The chief source of trouble to the commercial operation of long distance stations is the volume and the intensity of the atmospheric disturbances which are always present on the longer wave-lengths. These were found to be exceptionally severe on the long waves proposed to be used at these stations—namely, 6,000 to 16,000 metres, and it was at once realised that the usefulness of these stations for commercial business would depend to a great extent upon the ability to eliminate or minimise the trouble from this source. As stated above, experiments with the antenna did not appear to be the correct line of attack, since the sturb and the signal were diminished in about the same proportion, yet there is some advantage to be gained from this, since anything that decreases the continuous load on the detector must be of service.

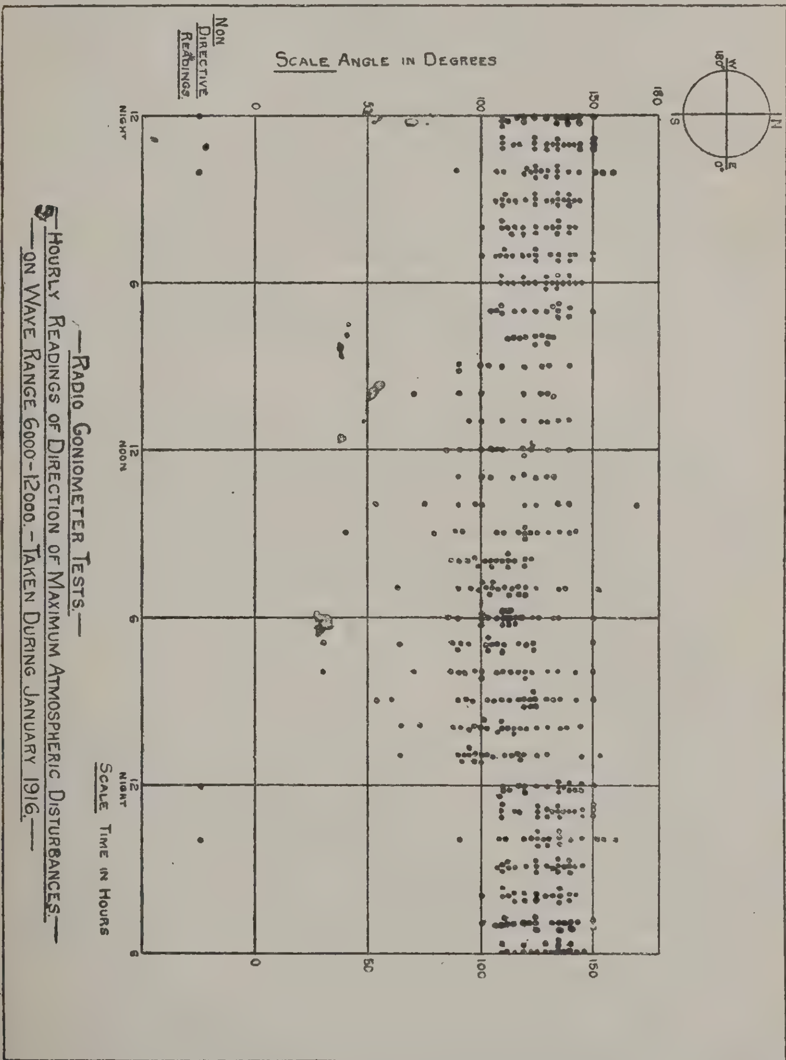
One of the first questions that naturally arises in connection with these sturbs is " Where do they come from ? " and it was considered that if their " office of origin " could be located this might help solve the problem of their elimination. For this purpose an investigation has been conducted at the Belmar station, where a directive antenna of the Bellini-Tosi type was erected. A receiving set with a radio-goniometer circuit was installed and continuous watch was kept throughout the last months of 1915 and the early months of 1916. An hourly record of the apparent direction of the maximum sturbs was kept during that period. The antenna was adjusted so that its zero line was 28° 14′ East of North ; the zero reading being on the East and the 180 on the West end of the line. The results are shown on the various charts annexed hereto (*see diagrams on pages* 737 *and* 739).

At first sight, the results for our first month of this work was not very promising—this is the chart for part of September and all of October—but it will be seen that the greater number of readings showed that the sturbs were travelling past the station in some definite direction. By the help of the daily variation curves it can be seen that the bulk of these sturbs are moving in a direction embraced by the angular range of 90–130, and that outside this range there is another lighter group with an angular range of 50–70, and the other directive readings are scattered around as would be expected. It may also be remarked that the readings showing lack of directivity are more frequent in the first chart than in any of the subsequent ones.

These observations were carried out on a wave-length group from 5,500 to 12,000 meters, and the Arlington 10 p.m. time-and-weather-signals formed the subject thereof. Although it was usual to find no marked alteration in the directivity of the maximum sturb when a wave change was made, yet this is by no means invariably so. This change in the directivity was most marked when swinging from the shorter group of waves to the longest. For instance, a reading on 5,500 gave the angle as 93 and an immediate change to 9,500 gave 120. It was noticed that the shorter wave-lengths favoured the 50–70 region of sturbs. It was also shown that occasions when there were more than one maximum are not infrequent.

At the same time as the noisiest position was being noted, a record of the least noisy was made. This minimum was sometimes rather hard to locate, showing the presence of sturbs travelling in more than one direction even when there was no observable double maxima. The

minimum was seldom strictly 90 degrees from the maximum angle, but rarely deviated far from it. In general it seemed to be slightly less than 90 degrees. When more than one minimum is observed, and no double maxima, it was usually found that the maximum was very broad, even when the two minima were each quite sharply defined. It was, however, more usual to have an ill-defined minimum even when the maximum was sharp. The changes in the directivity of the



Radio-Goniometer Tests. *See page* 738.

maximum sturb were sometimes sharp enough to follow during the hour; for instance, on October 15th, at 10 p.m., the maximum was at 120; fifteen minutes later it had increased to 122; another ten minutes and it had climbed to 128; after which it fell off and had diminished to 117 by the end of the next fifteen minutes, and continued to decrease, reaching 114 ten minutes later and 110 at 11 p.m.

From these observations we should gather that the bulk of the sturbs at Belmar are due to disturbances travelling by the station in a direction approximately 90 degrees from the zero line, and that there is a secondary source travelling in a direction averaging 60 degrees from the zero line. This latter source appears to be less evident during the winter months.

It would therefore appear that the major portion of the sturbs at Belmar are travelling in a direction that may be roughly designated as across the line of the coast.

At the same time as these observations were being made, record was kept of the goniometer angle at which several of the long distance stations gave maximum audibility and it was found that there was a discrepancy between the true directivity and the apparent directivity of their waves as they passed this station. These results are set out chiefly because of its bearing on the true direction of the sturbs and they must not be accepted as final until further confirmation has been made both at this point and, if possible, at others. (*See diagram on page* 739).

At Belmar the deviation between the true direction of a long distance station and the goniometer angle of the direction of its radiated waves as they travel by that station is sometimes considerable. This variation appears to depend, to some extent, upon the electrical clarity of the atmosphere. For instance, when the signals from Glace Bay station are at their normal or above their normal strength their apparent direction lies close to the average of a number of observations around the true direction; but if they are much below their normal strength then the deviation may be large, both from the true and the average directions.

Unfortunately there are few stations to the west of Belmar upon which a series of daily observations could be made, and there is thus a very big gap in these records.

No especial variation was noticed during the sunrise and sunset periods beyond that already recorded for periods of weak signals at other times during the day. And it is curious to note that the directivity of the Arlington wave was furthest from the true bearing of that station on a night when a tropical storm warning was broadcasted.

So far as can be seen, a change of wave length at the transmitting station does not affect this deviation except in the event of the received signal being weakened below normal.

No observations of this nature have been taken on the Pacific coast so far as I am aware, and a series of these should be made both for that coast and for an isolated spot like Honolulu.

It is quite frequently found at the stations at Honolulu that there is a certain wave-length selectivity to the sturb. When the short wave stations are being bothered very badly the long wave stations may be reporting this trouble normal or even below normal. During the local storm season this sturb trouble is heavy on the long waves and varies

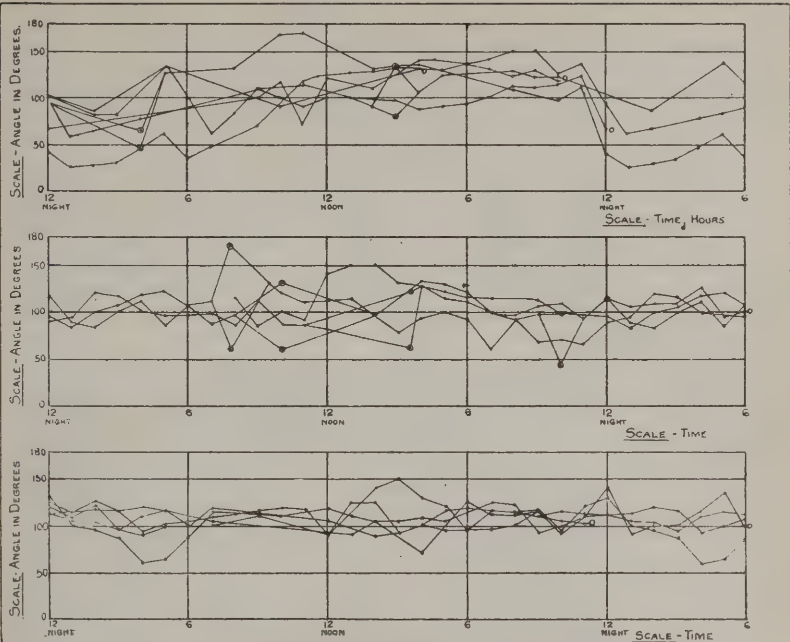


CHART SHOWING DIURNAL VARIATION IN THE ANGLE AT WHICH STRAYS ARE A MAXIMUM DURING SEPTEMBER, OCTOBER, AND NOVEMBER 1915 WAVE LENGTH RANGE COVERED 6000 – 12000 M

with the storms. So long as the trade winds blow and the atmospheric conditions are unchanged there is a marked absence of this type of trouble. But while there is a daily change in the weather conditions the sturbs are present in great force just as they are on the coast.

At the Marshall station in California, trouble from sturbs is heavy throughout the summer months and gets lighter during the winter. During the heavy wind storms which are quite common during the spring at this station there seemed to be some relation between the intensity of the sturb and the barometer reading. During very heavy gales when the wind was varying in velocity very rapidly the strength of the signals and of the sturbs appeared to follow the fluctuations of the barometer. On one occasion the barometer needle was oscillating between 29.44 and 29.52 at a rate of about 10 cycles per minute. When the wind increased suddenly in velocity, the barometer fell and the strength of the sturbs and of the signals decreased in strength to a remarkable degree, and returned to normal as soon as the gust passed. This phenomenon recurred with several of the wind storms when the local weather bureau reported a wind velocity between 90 and 100 miles per hour, and the wind was very gusty. During the summer months observations on the movements of the barometer needle and the prevalence of sturbs were made but definite relation could be established.

The effect of the humidity was also noted, but here again the results were disappointing. Without doubt a much more extended series of observations must be made upon both of these points.

Interference is another problem that has already assumed nearly as much importance as that of the sturbs and will undoubtedly increase in importance as the number of stations radiating energy in any considerable quantity is increased in any area. If the receiving circuit is one that can be readily set into vibration, then it will be impulsed by waves of very different lengths and the detector circuit may respond. The problem would be more simple if (*a*) all these signals were of the same order of loudness when the circuits are in resonance with their wave-lengths, if (*b*) they all had the same shape of wave-train, and if (*c*) their wave-lengths were not all packed closely together. Unfortunately the interference that is the cause of most of the trouble usually comes from nearby power stations employing considerable power a few miles off and working on a wave-length that is not very different from that being used by the station about 2 or 3,000 miles off, the signals of which are to be copied.

There is a wide difference in minimising interference from a nearby spark and a nearby arc station. In all modern spark stations the emitted wave trains produce a more or less clear musical tone in the telephones of the receiver. Change of wave length is not indulged in by commercial spark stations to any marked extent, so adjustments can be made and set up to remain indefinitely. But with a local arc station one has much more trouble to guard against. In addition to the working wave there is also the compensating wave and the noises of the arc. The compensating wave area sometimes seems to be unnecessarily broad, and if it is close to the transmitting wave the two may overlap and make a very broad disturbance area. As a sample of these wave areas the following taken in November last may be cited. (*See diagram on page* 741.) The audibility throughout these areas was 20 plus. The tuning condenser ranges were for the lower group from 10 to 42 and for the upper group from 60 to 96 ; the total range of the condenser is 0 to 180. The wave-lengths corresponding to these adjustments were 5,000 to 7,870 and 8,980 to 10,990 meters. Frequent wave changes make it difficult to adequately protect a circuit, but these frequent changes are of extreme use to one who is watching out for opportunities for the study of this problem.

The effect of the arc-upon-spark signals varies with the difference in length between the two waves. If identical or closely similar, there is a smothering effect upon the distant spark station's signals if these are quite weak ; in the worst cases the spark signals cannot be heard through the arc noises. If the two wave lengths are near to one another most pronounced beats will be heard ; the spark appears to throb, a result that makes the signal rather difficult to read. A distant arc, one the operations of which are not particularly noticeable in the receiver, will also cause this throbbing, and in such cases there is no audible evidence of the arc yet the signal seems to fade and grow as would be the case if there were a swinging fault on the line. In both of these cases the spark signals can be read, even if the incoming signal is relatively weak. At other wave-lengths the arc will heterodyne the spark signal and improve its audibility in the well-known manner due to this method of reception. Unfortunately, the arc station would not maintain this wave-length and assist the spark work as often as could be desired.

In a general way, it seems better to overcome the interference from

this source by tone working, as the musical note is more readily followed through the arc noises than the tones derived by the heterodyne method of reception. But there are many occasions in which the ability to alter the pitch of the signal more than compensated for the other defects of this method, and the increase in the audibility of the signals assisted the operator.

Working on long waves has demonstrated that stations at a moderate distance can impulse these receivers in a troublesome manner if they—the distant station—are being operated upon a wave that is a submultiple of the wave for which the receiver is tuned. It has also been noted that this trouble increases if the long wave is some even multiple of the shorter one. On one occasion it was found that a certain station was quite troublesome from time to time although it was at a moderate distance away, and on other occasions it was scarcely audible. So far as could be ascertained no changes were being made at that station. But wave-length changes were being made at the Marconi stations, and it was soon evident that the interference was most troublesome when these were tuned to a wave length that was an even multiple of the wave-length of the disturbing stations, and was less troublesome when the received wave was either an odd multiple or not strictly related to their wave.

Advantage was taken of this feature in some work on the minimisation of these and sturb troubles. The antenna circuit may be tuned to a multiple of the wave length to be received and the secondary circuit set at the correct wave length; then it will be found that the troubles from sturbs fall off at a greater rate than does the strength of the signal. In this case amplification can be resorted to with advantage.

An alternative method is one in which the antenna is made to be less readily impulsed, a procedure that decreases its receptivity, and the gain in its relative freedom from the above troubles may be utilised by the amplification of the incoming signal above that which is possible on circuits that are crowded with sturbs.

THE ACHIEVEMENTS OF WIRELESS TELEGRAPHY

By P. W. Harris.

> " No rock so hard but that a little wave
> May beat admission in a thousand years."
> —*Tennyson.*

THE fascination of wireless exerts itself equally among scientific and non-scientific people, and similarly it is as much discussed in the palaces of the mighty as in the humblest homes. Unlike liquid air, radium, and other scientific curiosities, which were treated at the time of their discovery as great marvels, wireless is not a " nine-days wonder " because of its enormous and world-wide utility. The cause of the fascination is not far to seek and may be said to depend upon the fact that radiotelegraphy is the one science which appeals to the public sense of the dramatic.

Jules Verne, even in his higher flights of fancy, never foreshadowed the marvels which to-day are accepted as commonplace in the world of wireless. When we think of whole ships' companies saved from disaster by a few rhythmic pulsations of the ether; when we read of vast oceans bridged in the fraction of a second by waves originating in the entanglements of wire surrounding a few masts ; of mariners quietly checking their chronometers deep in the night from signals which have flashed from stations so distant that nothing less than a week of hard steaming would reach them ; we are touching but the fringe of the romances of reality which occur every day. Can it be wondered at that in the dreams of the schoolboy of to-day wireless operating figures much in the way that engine-driving did to the previous generation ? Yet, in spite of this widespread interest in the science and the constant record of progress which is brought under the eye of the intelligent newspaper reader, it is safe to say that very few members of the general public fully realise the ubiquity of wireless, its reliability and the extent to which it has contributed to the world's progress. For this reason a general review of the achievements of wireless will perhaps not be out of place in this book, where we find brought together so many useful facts connected with the science.

At the present time, when the great world calamity of war is uppermost in our minds, when perhaps for the first time in our generation the true benefits of peace are popularly realised, we may start by considering the relation of wireless telegraphy to the great struggle. Firstly, then, it is pre-eminently useful at sea in providing a means of transmitting orders from headquarters to the units of the navy, and for reporting with rapidity and facility the results of scouting patrols and raiders. A lesser known application is that of connecting the system of mine sweepers, whose great silent work, tireless and nobly carried out, makes possible the ocean transport without which this country would inevitably perish. The third great use of wireless in naval warfare is one of which as yet the public knows nothing—*i.e.*, finding the exact location of the enemy's vessels. Perhaps in next

year's edition of the YEAR BOOK it will be possible to give an account of this special work, but at present the limitations of censorship render this description impossible. Lastly might be mentioned the value of wireless telegraphy in providing a means of communication between naval aircraft and the ships to which they are attached. An aeroplane flying high and observing the enemy in the distance can signal the result of observations to the waiting operator below without a moment's delay. Wireless is also invaluable for signalling the result of distant gun-fire. With modern long-range weapons, such as those carried on the famous *Queen Elizabeth*, it is possible with proper observation to place a shell with deadly accuracy at a distance of many miles.

In land warfare radiotelegraphy is of enormous value for keeping the various units of the army in touch with one another and linking them up with headquarters. With a portability entirely its own, and without the need of the trailing wire, which is, of course, indispensable in all portable wire telegraphs and telephone installations, wireless reduces to a minimum the risk of communication being broken by the gun-fire, which may at any moment sever the best system of wire communication. Apart from direct hits by the enemy shells, which, of course, destroy wire and wireless telegraph alike, the wireless method is rarely put out of action for more than a few minutes at a time, and if the aerial should be destroyed by a passing shell or a near-by explosion, another can be erected within a few minutes by the telegraphist in charge. In the case of a wire telegraph, however, a shell explosion may sever the connection miles away, necessitating a long delay for repairs, not to mention the exposure of the sapper entrusted with the work. Portable wireless stations by the hundred are in daily use on all fronts, some being used exclusively for communicating with the aeroplanes, whose duty it is to observe results of gun-fire, others for receiving and transmitting lengthy and important messages to headquarters.

The large airships of both Allies and enemy, constantly cruising through space, scouting for submarines in the water below and watching for the appearance of hostile vessels on the surface of the sea beneath them, are all equipped with radiotelegraphic installations. It is well known to the authorities here that the Zeppelins, when cruising over the North Sea and making their futile air raids upon this country, constantly keep in touch with one another and with Germany by means of the comparatively high-power wireless installations which they carry.

These are some of the main uses of wireless in warfare. There are a number of minor applications, such as that of rendering assistance to the fleet of auxiliary cruisers whose duty it is to search neutral ships. Thus if the smoke of a neutral vessel appears on the horizon a few brief radio messages will soon determine whether she has yet been searched and from which direction she has come.

Wireless, however, is best known for its services to mercantile vessels in the happy days of peace. All of the largest vessels were fitted with radiotelegraphic installations long ago, and the many dramas of the sea in which wireless has played a part, such as the loss of the *Republic* and the wreck of the *Titanic*, have been fully reported in the papers.

For this reason most people are well acquainted with the use of

wireless in calling for assistance, and we will therefore pass on to consider the other maritime uses which are less widely known.

The radiotelegraph on board ship can be said to have four distinct functions besides that of calling for help in cases of distress. The first of these is the transmission and reception of telegrams relating to navigation, by which the captain is able to learn of the presence of ice, derelicts, and the positions of other vessels in his track. Valuable storm warnings are also frequently transmitted to ships at sea, from Government stations on shore who circulate them broadcast. Further, if direction finding apparatus is carried, the position of coast stations and other ships can be accurately ascertained in fog.

Secondly, in normal times many vessels carry a meteorological observer (usually one of the officers) who twice daily transmits to the meteorological authorities ashore observations of the weather in the locality where the ship then finds itself. In this way the authorities are able to make intelligent anticipations of the weather and advise mariners accordingly.

Thirdly, the wireless apparatus makes possible the reception of accurate time signals. These are sent out daily at appointed times and, being practically instantaneous in their transmission, enable the navigating officers to check their chronometers to a nicety, even though far distant from land. Fourthly and lastly, we have the important use of wireless in transmitting and receiving the great volume of private messages from passengers and their friends. In peace times many business men crossing between New York and London keep in touch with their offices and carry out important business transactions by this means. Merchants and stockbrokers are no longer isolated from the markets of the world when taking ocean trips, and on many large liners the latest stock quotations are published every morning.

On the land the uses of wireless are many and varied. It is now in direct competition with the cable telegraph for transmitting messages across the Atlantic and Pacific Ocean, enormous volumes of traffic being handled accurately and expeditiously in this way. A very long article specially devoted to the subject would be needed to describe the working of the long-distance wireless stations. These great installations are now able to transmit and receive simultaneously, thus greatly increasing the efficiency of the station and doubling the traffic handling capacity. Transmission and reception can be carried on equally well by day or by night, and very high-speed working by automatic apparatus is gradually replacing hand transmission. Automatic reception is also firmly established, and speeds of over a hundred words per minute are not uncommon.

It is not generally known, although the fact deserves the widest possible publicity, that the wireless service is now handling business messages at rates which are in all cases substantially lower than those of the cables. The Marconi Transatlantic rate, for example, between London and New York is 8d. per word for ordinary telegrams as against 1s. per word by cable.

While writing of transatlantic wireless it may be well to dispel the false impression which still seems to exist in some quarters that the transatlantic wireless service is precariously carried on by handing the message from a coast station to a ship, thence to another ship,

and so on through a dozen vessels until the other shore is reached. This form of transmission has never been used, even in the earliest days of transocean communication. The messages are transmitted directly and without relaying from the British shore to the coast of America, the signals crossing the ocean with the speed of light. It is also thought by some that long-distance communication can only be carried on at night, whereas it is carried on equally as well in broad daylight as in the depths of the night.

Another service of which the general public is not generally aware is that which exists between San Francisco and Japan by way of the Hawaiian Islands, the Pacific being crossed with but one relay. Quite frequently transmission takes place between San Francisco and Japan directly and without any relaying with the Hawaiian Islands.

The use of wireless in linking up islands with the mainland has resulted in the removal of the isolation which hampered trade in so many parts of the world. As the cost of a pair of wireless installations, one on the mainland and the other on the island, is far less than that of a cable between the two places and as, furthermore, the service is equally good, it is not surprising that in this field radiotelegraphy is pre-eminent.

In the vast equatorial and tropical jungles and similar districts where it is impossible to erect a wire telegraph, hundreds of wireless installations are giving excellent service at a very low cost of installation and upkeep. On the South American continent alone radiotelegraphy has firmly established itself as a means of linking up the various centres of commercial activity, and even railway companies are adopting it in place of the wire telegraph. Explorers, too, forcing their way through the dense vegetation, are able to keep in touch with civilisation, even though they seem to be separated from it by hundreds of miles of the densest vegetation, which can only be pierced by prolonged effort. A great deal of very valuable work in surveying has been carried out solely through the help of wireless.

It has often been urged that radiotelegraphy has the fatal drawback of lack of secrecy. Superficially it may appear to possess this fault, but a little consideration will show that where necessary its secrecy is very real. Whilst it is true that an operator can record the messages which are passing between other stations within range (can "tap" them, in common parlance) all wireless installations are under Government control and all operators are sworn to secrecy. In cases where it is necessary to withhold the information even from officials of the telegraph service, the messages can be sent in a secret code—the procedure adopted in warfare. The thousands of secret messages which are daily transmitted in war-time and which, being in code, are absolutely incomprehensible to the enemy, should prove conclusively that wireless has all the secrecy which is necessary.

The possibility of inter-communication between a number of wireless stations is of the greatest value when it is necessary to transmit general warnings and signals of distress. If it were not possible for one station to intercept the messages of others much of the value of wireless at sea would be gone. The same remarks apply to the distribution of storm forecasts, time signals, news services, and the like, which are intended not for one station but for many.

The so-called secrecy of the wire telegraph is more apparent than

real. A message handed in at a telegraph office has to be passed through the hands of a number of officials and, in the case of telegrams for long distances and country places, re-transmission may take place half-a-dozen times. In many post offices the telegraph instruments are separated from the public counter by a light screen, and any expert telegraphist standing at the counter can overhear in full every message received and every word sent on the key. The practical secrecy of the wire telegraph, as of wireless, comes not from the fact that it is not possible to intercept messages, but because all the officials who handle the messages are sworn to secrecy. A person sufficiently skilled to tap a message is in all probability already professionally engaged in the telegraph service and as a consequence pledged not to reveal what he hears. With regard to the interception by amateurs, no person is allowed either in this country or in the United States to possess a wireless installation without making a declaration to preserve the secrecy of anything that may happen to come to his notice by wireless. In the United States, where there are thousands of amateurs, many of them highly skilled, the use of wireless for business purposes is extremely popular and certainly would not be so if there were any real objections to its use.

In closing what must necessarily be a very scanty review of the subject, our mind reverts to the quotation at the heading of this article, and to the enormous number of practical difficulties which have already been overcome. Thus we have seen that it is now possible to work regularly day or night over thousands of miles; automatic duplex high-speed working—once thought by most telegraph officials to be an absolute impossibility in wireless—is now firmly established; automatic recording of messages is carried out daily at many long-distance receiving stations; the apparatus on both ship and shore stations, once delicate and erratic, is now thoroughly strong, reliable and fool-proof, and manufactured to standard specifications. Accurate calculations of range and power has taken the place of the old methods of trial and experiment, and if it is desired to erect a pair of stations to communicate over 2,000 miles, the specifications can be drawn up and the station erected with the certainty that they will fulfil all requirements.

Although there are one or two outstanding problems which prevent us achieving the ideal, these are being tackled by experts and will doubtless shortly disappear. The rocks of difficulty are being worn away, not slowly but rapidly, and who can say whither wireless will lead us in another decade?

INTERNATIONAL TIME AND WEATHER SIGNALS

IN days to come a great part will be played by wireless telegraphy in regions of activity of which at present it only touches the fringe. Prominent amongst such future spheres of action is World-Surveying. Already it has been possible through radio agency to determine the differences of longitude between Paris and such places as Algiers, Brest, Bizerta, Brussels, Toulouse and Nice, whilst in July 1916, by the aid of wireless, the differences in longitude between Paris and Washington were determined to an accuracy within ·01 of a second.

These Franco-American investigations had extended over two years and nine months, and the result expressed in terms of time was found to be 5 hours 17 minutes 35·67 seconds. Moreover, the Commissioners engaged in the delimitation of Franco-Liberian and Franco-German frontiers in the Congo utilised radiotelegraphy for the determination of the longitudes of the boundaries, an example which was followed also on the occasion of the rectification of the lines of demarcation between Brazil and Bolivia. Our French Allies have demonstrated its extreme utility in this respect by determining numerous points in Morocco simply and solely through utilisation of the scientific signals transmitted nightly from the Eiffel Tower. Superior to the trammels imposed in primitive countries by jungle, bushland, deserts and other natural obstacles, radiotelegraphy possesses most important potentialities for future service in the cause of Science as well as of Commerce. There are yet many parts of the world to be mapped out which are not only difficult of access, but which also contain districts whose natural characteristics absolutely prohibit the use of ordinary surveying methods.

As some indication of what will in the future be possible, we put forth the following information concerning time-signalling and meteorological services, carried out at various wireless stations, in the hope that they may prove of practical as well as scientific interest, and we believe them likely to make a special appeal to the attention of mariners. Owing to the present crisis it is impossible for us to say definitely that the services referred to in the following pages are being still maintained. Where it has been possible to bring them up to date we have done so, but in other cases such a course has been found to be impracticable.

ARGENTINA.

The Naval Observatory at Darsena Norte, situated on the northern entrance to the Port of Buenos Aires, sends out, through the radio station located there, five time signals daily (Sundays and holidays excepted), on a wave length of 800 metres. Their method of transmission consists of the sending of a series of five groups of dashes with a dot at each minute. This system is detailed in tabular form in Note 268 on page 456.

AUSTRALASIA.

The Dominion Meteorological Bureau of Wellington and the shipping companies previous to the war arrived at an agreement with the Commonwealth Meteorological Office at Melbourne for the exchange of news and meteorological information.

Ships are to give information concerning the state of the weather when they are 300 or more miles from the coasts of Australia or New Zealand, or whenever the captain may consider that the atmospheric conditions offer special interest. As far as Australia is concerned all ships which approach or leave Cape Leeuwin will report concerning the atmospheric conditions which prevail.

Until further orders such messages will be accepted on board for transmission without prepayment of charge provided they conform to the following conditions :—

1. That they are written in the special code supplied by the Meteorological Offices.

2. That the messages shall be drawn up by the responsible officer (" observer "), and not by the operator.

3. That the text shall be prefixed by an indication showing whether " Melbourne time " or " Wellington time " is being followed.

4. They shall not deal with other than the following points :—

a. Position of the ship.
b. The barometric reading.
c. The direction and velocity of the wind.
d. The state of the weather.
e. The condition of the sea.

and they shall be written in the prescribed form.

All telegrams as a rule shall be immediately forwarded by the quickest route and shall have priority as a Government message. For these the ship tax will not be collected.

* * * * * *

Time signals are transmitted by the Melbourne Radio station at noon and midnight (Sundays excepted) Victorian standard time (10 hours ahead of Greenwich), international time signals being used.

Ocean forecasts are transmitted by the following stations at the hours specified (Melbourne time) :—

Adelaide, 7 p.m. and 8.30 p.m.
Brisbane, 10.30 p.m. and 11 p.m.
Hobart, 10 p.m.
Melbourne, 7.30 p.m. and 9 p.m.
Sydney, 8 p.m. and 9.30 p.m.

Other stations may repeat as requested or as necessary.

N.B.—The arrangements given above with regard to meteorological messages from ships would appear to have been temporarily withdrawn, but are given here as a matter of interest.

The following note explains the situation as far as New Zealand is concerned, but up to the time of going to press we have no similar information from Australia of any services other than the transmission of time signals and ocean forecasts as referred to above.

Note Concerning New Zealand.

The Secretary of the Marine Department states that wireless weather forecasts, which were discontinued at the commencement of the war, have been resumed during 1916, and are sent out through the

radio stations at Awanui, Wellington, and Awarua on the usual reporting nights, and at other times when deemed necessary. A daily wireless weather report was authorised from the Chatham Islands wireless station and commenced on April 8th, 1915; it has been maintained without a single break. Part of this message is also transmitted by cable to the Commonwealth Weather Bureau for research purposes. Forecasts are also occasionally transmitted to the Chatham Islands, for which a small charge is made by the Post Office, but usually the Wellington forecast suffices. Macquarie Island radio station was closed on October 14th, 1915. Since it was opened by Sir Douglas Mawson it has done very good work indeed and is one of the most notable researches in meteorology of the day. Since Sir Douglas Mawson sold the establishment to the Australian Government the New Zealand Government has contributed £500 per annum toward its upkeep, mainly the research into Antarctic conditions, and to link up with the Imperial Antarctic Expedition still in the South. It has also proved a valuable aid in forecasting in dealing with westerly storm areas. Some valuable records from the island were lost in the s.s. *Endeavour*, but there is much scope for research work upon the records which remain. The records were not entirely lost, for they had been partly transmitted by wireless before the originals were removed.

CANADA.

Important weather forecasts are sent out from various Canadian coast stations to ships upon request. (See note 46 in land stations section, page 442).

EIFFEL TOWER (PARIS).

The following arrangements are based on the decisions arrived at at the International Time Conference held in Paris in 1912 modified in accordance with the teachings of experience :—

The radiotelegraphic station of the Eiffel Tower transmits each day signals and telegrams of general interest, which are enumerated below :—

"Ordinary time signals" sent out thrice daily: (1) at 10 a.m., (2) between 10.44 a.m. and 10.48 a.m., and (3) at 11.44 p.m. to 11.49 p.m., and at midnight.

"Scientific time signals" at 11.30 p.m. preceding the ordinary night time signals and a correction group (following the ordinary night signals) at 11.50 p.m.

Two "meteorological radiotelegrams of general order" transmitted each day, one immediately after the morning time signals, the other at 5 p.m.

"Measure signals" intended to permit observers to study the variations of intensity of the signals according to the time of year and the meteorological conditions, which are transmitted twice daily before the ordinary time signals.

"Urgent notices to navigators" which are sent whenever an important maritime danger is known to exist near the French coast or near the coasts of neighbouring countries.

The transmission of these signals takes place after the ordinary time signals.

All transmissions are made with a wave-length of about 2,500 metres and using the maximum power which the station has at its disposal.

Ordinary Time Signals

At 9.55 a.m. three calls (— - — - —) will be given, followed by "ordinary time signals," then the signal "wait" (- — - - -).

The "ordinary time signals" commence at 9.57 a.m. and end at 10 a.m. They are transmitted automatically by means of special apparatus situated at the observatory in Paris and managed by the staff of that establishment.

The connection between this apparatus and the radio station at Eiffel Tower is established a few instants before the transmission by means of subterranean lines.

The composition of these signals is given by the illustration on the next page.

The complete minutes 9.58, 9.59, 10.0 are therefore indicated by the end of the 3rd lines of the series of three dashes, all confusion being avoided by the fact that the signals preceding these dashes are different for each minute.

The letters X (— - - —) of the first minute constitute only advice and tuning signals.

All the dashes, dots, and spaces of dots, or dashes of any one letter in the remainder of the signals are of equal duration, dashes = one second, dots = one-quarter of a second, intervals = 1 second.

The letters N (— -) which characterise the second minute commence numbers of 10 or more complete seconds plus eights, 8, 18, 28, 38, 48, and the beginning of the dots of these same letters are produced exactly at the tens of seconds 10, 20, 30, 40, 50.

In the same way the letters G (— — -) characterising the third minute commence all numbers of 10 or more plus six, 6, 16, 26, 36, 46, and the beginning of the dots of these same letters are produced exactly at the tens of seconds, 10, 20, 30, 40, 50. The second set of time signals starts at 10.44 a.m. with a series of "T" (one dash), followed by one dot at 10.45 a.m. precisely. At 10.46 a.m. the French operator sends a series of "D" (dash dot dot), which is again followed by a dot at 10.47 a.m., whilst at 10.48 a.m. starts a series of "6" (dash and four dots) again followed by a dot at 10.49 a.m.

The "ordinary time signals" by night are transmitted in the same way.

The calls are initiated at 11.44 p.m. (or 23.44 French time) beginning with a "T" series, followed by a dot at 11.45 p.m., but a "D" series at 11.46 p.m., followed by a dot at 11.47 p.m., and by a "6" series followed by a dot at 11.49 p.m.

For receiving these hourly signals, termed "ordinary," it is only necessary to have the antenna, of dimensions and height varying according to the distance from Paris, connected with a radiotelegraphic receiver, and to listen to the signals, with the clock or watch to be compared in front of the observer. It is easy for an unskilled person to start by estimating the difference up to half a second between the hours indicated by the clock and those which correspond with the signals that are heard in the telephones of the receiver. After some practice it is quite easy to estimate one-quarter of a second. In order

MR. A. E. KENNELLY, PRESIDENT OF THE INSTITUTE OF RADIO ENGINEERS, U.S.A.

(For whose Biographical Notice see page 884.)

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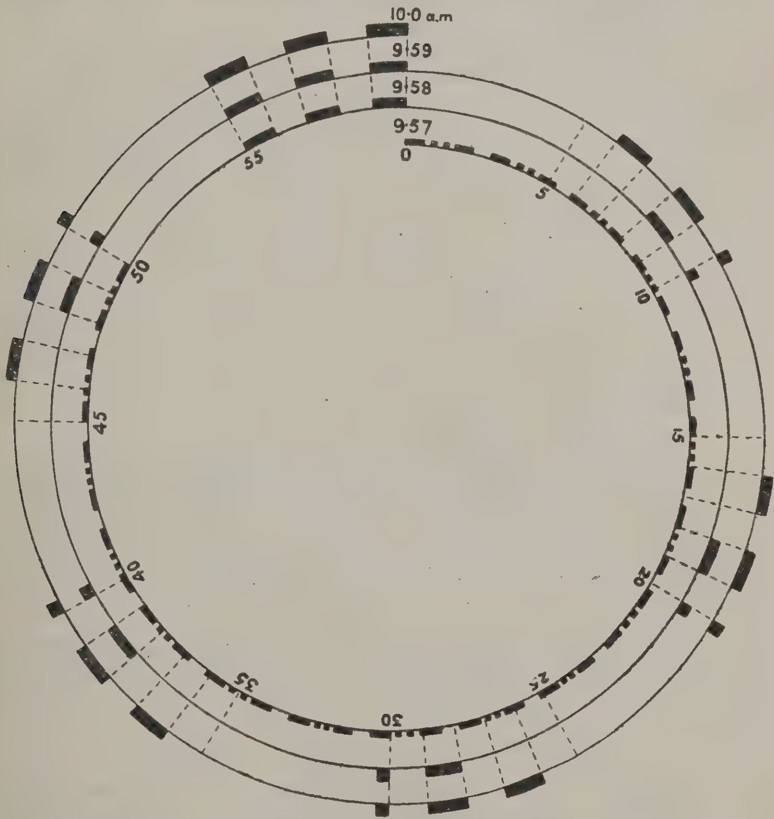
to reach an accuracy of one-tenth of a second, it is generally necessary to have recourse to simultaneously recording on the same photographic strip the radiotelegraphic signals and the beats of the clock to be compared. Excellent results have in this way been obtained by various physicists and engineers. It frequently occurs, especially in winter, that the Paris observatory is not able to make astronomical observations each night. It is therefore necessary to be satisfied with the times registered by the chronometers of which the rate is known for the setting of the clock which sends the signals. These chronometers, being sufficiently numerous and accurate, such a procedure causes no inconvenience so long as the cessation of astronomical observations does not exceed a few days. If, on the other hand, the period of cloudy weather continues too long, it is no longer possible to answer for the



The international service of time signals is shown in the above diagram. From the 57th minute of the hour warning signals are sent out consisting of the letter X (— · · —) repeated for fifty seconds, followed by silence for five seconds, after which the first time signal is given, consisting of three dashes each lasting for one second, separated by intervals of one second. Thus the end of the third dash coincides precisely with the end of the 58th minute. Afterwards the letter N (— ·) is sent for every ten seconds, followed by the second time signal, and finally a series of G's (— — ·) followed by a third time signal, the last dash ending precisely at the hour.

accuracy of the chronometers. Wireless telegraphy in such cases furnishes a method which allows of the co-operation of other observatories, better situated as regards climatic conditions, in the determination of the state of the master-clock at Paris, and in consequence in the accurate setting of the clock which sends the signals.

Scientific Time Signals.

Every night at 11.29 p.m. (23.29 French time) three calls (— - — - —) are made, followed by the words "scientific time signals."

Starting at 11.30 p.m. (23.30 French time) a series of 300 dots each formed of a single spark are transmitted, the 60th, 120th, 180th and 240th being suppressed in order to establish the indication for counting purposes.

This series is heard (1) at the observatory in Paris in a wireless receiver and compared with the tickings of a time-keeping clock by the coincidence method. A simple calculation permits of passing hours (noted by the clock), of the coincidences to those which are exact to 1 or 2 hundredths, of the 1st and 300th dots of the series, which may be transformed in "legal time hours" by adding the corresponding correction of the clock.

These latter hours are transmitted by the Eiffel Tower soon after the end of the "ordinary time signals" by night, in the following manner:—

If the hours of the first and 300th beats are, for instance, 11 hours 30 minutes 8.15 secs. p.m. and 11 hours 35 mins. 1.17 secs. p.m., the two following groups of figures three times repeated would be transmitted:—

— - - - — 300815. 350117 — - - - — 300815. 350117
— - - - — 300815. 350117.

In order to know approximately the correction to be made to a clock (or a chronometer) with reference to the legal international time of the observatory, it is sufficient to listen to the ticking of that instrument by means of a microphone suitably attached to a radiotelegraphic receiver at the same time as the series of 300 points are transmitted by the Eiffel Tower. It is necessary to observe and note the coincidences, and then the hours of the clock (or the chronometer) should be calculated at the moment of the 1st and 300th dots.

By subtracting these hours respectively from those sent out by the Eiffel Tower, it is possible to obtain two values of the correction of the instrument for measuring time which should be correct to about two hundredths (.02) of a second.

At 11.50 p.m. correction groups for those scientific signals are sent out.

Meteorological Signals.—Apart from these time signals there are a number of signals connected with the meteorological service. These are of two kinds, the first of them affording an indication of the barometric situation of Europe as a whole, and derived from information supplied by Iceland, Ireland, France, Spain, the Azores, and America; the second of them sending out similar information regarding the state of the weather for fourteen stations in Western and Mid Europe, from Stornoway to Rome, from Prague to Biarritz and Stockholm. These

telegrams are, of course, all coded, and numerals are employed to convey intelligence concerning the strength and direction of the wind, the state of the sky, and the state of the sea.

These reports are preceded by the initial letters BCM (*Bureau Central Météorologique*).

The morning report is transmitted at 10.49, immediately after the time signals commencing at 10.44 a.m. This time may be modified at a later date when the new time signals come into force.

(*a*) Six groups of 7 or 8 figures indicating the barometric pressure, the direction of the wind, state of the sky, and state of the sea. (This last figure appears in the groups containing 8 figures.) These groups are preceded by one or two initial letters indicating the name of the station referred to. R=Reykjavik (Iceland); V=Valentia (Ireland); O=Ushant (Brittany); CO=Corunna (Spain); HO=Horta (Azores); SP=Saint Pierre (America).

(*b*) Following the six groups of figures general atmospheric conditions for various parts of Europe are telegraphed in plain language (French).

(*c*) Groups of 7 or 8 figures giving the same observations for:—Paris; C=Clermont-Ferrand; BI=Biarritz; M=Marseilles; N=Nice; A=Algiers; SY=Stornoway; SH=Shields; HE=Helder (Holland); SK=Skudesnaes (Norway); ST=Stockholm; P=Prague; T=Trieste; R=Rome.

(*d*) General forecasts for France concerning the state of the sky and wind.

(*e*) The direction and force of the wind at the Eiffel Tower, 305 metres above ground, and probable wind for evening. This last information, for the use of aeronauts, is preceded by the initials FL; the velocity of the wind is indicated in metres per second.

A second report is sent at 5 p.m. It amplifies the morning report and takes into account variations which have been observed since 7 a.m., and to give a more precise forecast for the next day.

(*a*) The report consists of 8 groups of figures similar to the morning report for the following places:—Paris; BR=Brest; BI=Biarritz; N=Nice; V=Valentia; SK=Skudesnaes; R=Rome; CO=Corunna

(*b*) Forecasts of the weather.

(*c*) The direction and velocity of the wind at the Eiffel Tower at 4 p.m. and a forecast for the wind and weather for the following morning. The report is made from observations made at 2 p.m.

Example of Morning Weather Report.

BCM—R5132811—V57422445—064522544—CO67530183 - - - - - Depression N.W. Europe forte pression S.W. Paris 6512031 * * * * * * Probable vent W. modéré averses Nord et Est—FL SW. 13 probable W. 10.

Example of Evening Weather Report.

BCM—Paris 6262030 — BR65224455 — BIXXXXXXXX— N62222211 — V60022425 — SK36024655 — R6142030 —

CXXXXXXXXX — Baisse barometrique Baltique stationnaire — Manche—Vents tournant N.W. fortes Manche Mediterranée. Averses—FL W. 10 probable W. 8.

The translation of the above is effected in the following manner: The first three figures represent the barometric pressure in millimetres and tenths of a millimetre, the figure 7 always preceding the figures telegraphed; the 4th and 5th figures indicate the direction of the wind; the 6th the force of the wind; the 7th the state of the sky; the 8th the state of the sea.

The first group in the morning report is R5132811, which is translated below.

R=Reykjavik; 513 indicates that the barometric pressure was 751·3 millimetres; 28=direction of the wind, N.W.; 1=force of the wind, nearly calm; 1=sky, slightly cloudy.

The second group, V57422445.

V=Valentia; 574=barometric pressure, 757·4 millimetres; 22=direction of wind, W.S.W.; 4=force of wind, moderate; 4=state of sky, covered; 5=state of sea, very choppy.

When observations have not come to hand XX is sent; thus the third group of the evening report is BIXXXXXXXX, which signifies that the report from Biarritz had not arrived in time to be dispatched from FL.

Code for the Reading of Telegrams.

A group of any kind may be read as follows:—

e.g. N a a a d d f c m:

N=simple or double initial of the station.

a a a = Three figures giving the barometrical pressure to the 10th of mm.

It is necessary to add 700 to arrive at the exact pressure—*e.g.* =

a a a = 625 means that the pressure is 762·5.

d d = Two figures indicating the direction of the wind (see Table 1).

f = A figure giving the force of the wind (Table 2).

c = A figure giving the state of the sky (Table 3).

m = A figure giving the state of the sea (Table 4).

An observation which is not given is shown by letters x x.

Table 1.

4th and 5th Figures.

Direction of Wind.		Direction of Wind.		Direction of Wind.	
02	N.N.E.	14	S.S.E.	26	W.N.W.
04	N.E.	16	S.	28	N.W.
06	E.N.E.	18	S.S.W.	30	N.N.W.
08	E.	20	S.W.	32	N.
10	E.S.E.	22	W.S.W.	00	No wind (calm).
12	S.E.	24	W.		

TABLE 2.

6th Figure.

Beaufort No.	Description of wind.	Mode of estimating aboard sailing vessels.	Limits of Velocities.	
			Statute miles per hour.	Metres per second.
0	Calm	——	Less than 1	Less than 0·3
1	Light air ...	Sufficient wind for working ship.	1–3	0·3– 1·5
2	Slight breeze ...	Ditto	4– 7	1·6– 3·3
3	Gentle breeze	Ditto	8–12	3·4– 5·4
4	Moderate breeze	Forces most advantageous for sailing with leading wind and all sail drawing	13–18	5·5– 8·0
5	Fresh breeze ...	Ditto	19–24	8·1–10·7
6	Strong breeze...	Reduction of sail necessary with leading wind.	25–31	10·8–13·8
7	Moderate gale (*High wind*)*	Ditto	32–38	13·9–17·1
8	Fresh gale ... (*gale*)*	Considerable reduction of sail necessary even with wind quartering.	39–46	17·2–20·7
9	Strong gale ...	Ditto	47–54	20·8–24·4
†10	Whole gale ...	Close-reefed sail running, or hove to under storm sail.	55–63	24·5–28·4
†11	Storm	Ditto	64–75	28·5–33·5
†12	Hurricane ...	No sail can stand even when running.	Above 75	33·6 or above.

* It has recently been decided that for statistical purposes winds of force less than 8 shall not be counted as gales, and to avoid the ambiguity implied by the use of the term "moderate gale" for force 7 the Beaufort description has been modified for use in connection with the daily weather service by the substitution of the descriptions in italics for forces 7 and 8. For the modern Beaufort Scale as used in England see pp. 852-3.

† Only one figure is assigned in the code to wind force, and consequently forces 10, 11, 12 cannot be reported. It is usual in meteorological telegrams to send figure 9 and add the word "tempête" in cases where forces 10, 11 or 12 are observed.

TABLE 3.

State of the Sky.

7th Figure.

0 Sky quite clear } =b.	5 Rain falling.
1 ,, a quarter clouded } =b.	6 Snow.
2 ,, a half clouded = bc	7 Haze, light fog, or mist.
3 ,, three-quarter clouded = c	8 Fog.
4 ,, overcast = o	9 Thunderstorm.

TABLE 4.

State of the Sea.

8th Figure.

Description.	Condition of Surface.
0 Calm	Glassy.
1 Very smooth	Slightly rippled.
2 Smooth	Rippled.
3 Slight	Rocks, buoy or small boat.
4 Moderate	Furrowed.
5 Rather rough	Much disturbed.
6 Rough	Deeply furrowed.
7 High	Rollers with steep fronts.
8 Very high	Rollers with steep fronts.
9 Phenomenal	Precipitous ; towering.

SIGNALS OF MEASURE.

As the same length and strength of wave is always used in the transmission of time signals it is interesting, from the technical point of view of wireless telegraphy, for those making observations at different distances from the Eiffel Tower to compare the intensity of the reception of signals, by day and by night, at different times of the year. In order to facilitate these measures and comparisons of intensity, special signals are sent out for 1 minute at 9.52 a.m. and at 11.52 p.m. They are composed of 6 dashes, each one lasting 5 seconds and separated from each other by intervals of 5 seconds and preceded by 3 calls (— - — - —).

URGENT INFORMATION TO NAVIGATORS.

The use of the Eiffel Tower radiotelegraphic station for the sending of "urgent information to navigators" in case of grave maritime danger on the French coast, or even of neighbouring countries, is being considered.

Note.—The time at which the whole of the above regulations will come into force has not yet been decided. At the second International Time Conference, held in Paris in October, 1913, the question of definitely putting them into operation was discussed, and it was finally decided to postpone doing so.

EXPERIMENTAL CYCLONE WARNINGS.

For particulars of experimental systems conducted from coast stations in Madagascar see note 195 on page 452.

GERMANY (NORDDEICH).

The Imperial Radiotelegraph Station, Norddeich, emits twice daily, on a wave-length of 1,650 metres, time signals indicating the Greenwich meantime at noon and at midnight—*i.e.*, according to the European mean time usual in Germany, the hours 1 p.m. and 1 a.m.

Time signals are sent out by the Norddeich Station in the following manner at 12.53 p.m. (noon) and at 12.53 a.m. (midnight), Central European time (*one hour in advance of Greenwich*). Norddeich sends

out at first, for two minutes continuously, the signal - - - — (V), so that all stations desiring to receive the time signals may tune their receiving apparatus to the wave-length of Norddeich. At 12h. 57m. 47s. the call — - — - — is transmitted, followed by the call signal of Norddeich — - — - — - - - — (K A V), and the signals — — — — - — — - - M. G. Z. (Greenwich mean time). At 12h. 58m. 38s. the call signal — - — - — is again sent out. Another short interval denotes the close of these preliminary signals, after which the time signal proper is transmitted.

This signal consists of two groups of three, each lasting 5 seconds, and arranged so that each group ends with a full tenth-second, and the last dash of the last group indicates the time—1.0 mean European time. These signals consist of dashes lasting one second. The whole time signal therefore is sent, after the second signal of attention (— - — - —) has been given, and after the short interval has elapsed, in the following manner :—

12h. 58m. 46s., 48s., 49s., 50s. ;
One dash lasting ⅛ second at end of each second.
Interval of 6 seconds.
12h. 58m. 56s., 57s., 58s., 59s., 60s. ;
One dash lasting ⅛ second at end of each second.
Interval of 6 seconds.
12h. 59m. 6s., 7s., 8.,s 9s., 10s. :
One dash lasting ⅛ second at end of each second.
Long interval (26 seconds).
12h. 59m. 36s., 37s., 38s., 39s., 40s. :
One dash lasting ⅛ second at end of each second.
Interval of 6 seconds.
12h. 59m. 46s., 47s., 48s., 49s., 50s. :
One dash lasting ⅛ second at end of each second.
Interval of 6 seconds.
12h. 59m. 56s., 57s., 58s., 59s., and one o'clock.
One dash lasting ⅛ second at end of each second.

The last dash indicates the time : it commences at one o'clock Central European time, and is distinguished by the following concluding signal : - — - — -, which is transmitted at six seconds after one o'clock.

In order to ensure punctual transmission of the time signal, the Norddeich Station is equipped with a special astronomical precision clock which is regulated by the Imperial Chronometer Observatory in Wilhelmshaven. This clock automatically actuates the radiotelegraph apparatus at the indicated times so that the signals are transmitted with the maximum exactness possible. In case a time signal is transmitted indistinctly or incorrectly, the attention of the receiving stations is called to this fact by transmittiing immediately after the time signal the words : " Time signal void."

Meteorological telegrams are sent out daily from Norddeich at 1 p.m. (Central European time). Storm warnings are also transmitted as required and repeated three times, as soon as received. These warnings are repeated once at 1 p.m., or 11 p.m. (Central European time).

Bülk in Kiel Bay sends out storm warnings as they are received. These are repeated at 1 p.m. and 11 p.m. (Central European time).

GREAT BRITAIN.

At 9.30 a.m. in peace time the Admiralty station at Whitehall, in London, sends out a meteorological bulletin. At 10 o'clock the Cleethorpes weather report and forecast is sent out, this lasting about 20 minutes. Whitehall sends out an additional bulletin at 8.30 p.m., Cleethorpes at 10 p.m. The following is a specimen of the Cleethorpes weather report, which is preceded by the call signal CQ. CQ. CQ.

> A deep depression, 28·6, is still centred off the south-west of Iceland and pressure remains high over the Alps (Munich 30·5). A fresh secondary has appeared overnight off the west of Ireland, and the barometer is now falling at all western stations.
>
> *Forecast.*—Strong winds reaching gale force at times from direction between south and south-west probable off all British coasts ; sea rough and weather unsettled, squally and showery.

HOLLAND.

Since July 1st, 1915, the station of Scheveningen Harbour has been sending at 11.15 a.m. and p.m. (Greenwich time) on a wave-length of 1,800 metres a meteorological radiotelegram in Dutch and French, followed by a storm signal whenever necessary, and also a notice to mariners in Dutch and English.

The meteorological radiotelegram is preceded by the letters KNMI, and consists of four sets of two groups of five figures each for the stations Helder, Flushing, Gris Nez, and the Hague ; and, further, of four sets of two groups wherein one group has five and the other group four figures each for the stations Yarmouth, Shields, Skudnaes, and Sylt, according to the scheme BBBWW SHTT (G). In this scheme BBB stands for the atmospheric pressure in tenths of a millimeter, omitting the 700 ; WW indicates the direction, and S the force of the wind ; H gives the condition of the sky and weather ; TT the temperature in centigrade degrees, 50 being added to temperatures below 0° C. ; G indicates the condition of the sea, all being according to the scales given below.

Following the above comes, if deemed important, first, the storm signal—*e.g.*, warning signal, signal of shifting south-east storm ; second, the notice to mariners, preceded by the letters NBAZ—*e.g.*, wreck, mouth Hook of Holland.

The scales according to which the above information is reported are as follows :—

Every observation that is missing for each station is replaced by an appropriate number of X's.

Examples of meteorological radiotelegrams from the first and the fifth of the eight sets of two groups KMNI are 69010-21541 and 57316-4405 ; their translations follow :

HELDER.	YARMOUTH.
Barometer, 769.0 mm.	Barometer, 757.3 mm.
Wind direction, E.S.E.	Wind direction, south.
Wind force, very light.	Wind force, moderate.
Sky, slightly cloudy.	Sky, overcast.
Temperature, 4° C.	Temperature, 5° C.
Sea, very fine.	

Wind.				Conditions of sky and weather.		Condition of Sea.	
Direction.		Force.					
WW	Significance.	S.	Significance.	H.	Significance.	G.	Significance.
00	Calm	0	Calm	0	Clear	0	Smooth.
02	N.N.E., etc.	1	Almost calm	1	Slightly cloudy (¼)	1	Very fine.
06	E.N.E., etc.	2	Very light ..	2	Cloudy (½)	2	Fine.
08	E., etc. ..	3	Light ..	3	Very cloudy (¾) ..	3	Slightly rough.
12	S.E., etc. ..	4	Moderate ..	4	Wholly overcast ..	4	Rough.
16	S., etc. ..	5	Rather high	5	Rain	5	Swell.
20	S.W., etc. ..	6	High	6	Snow	6	Heavy swell.
24	W., etc. ..	7	Very high ..	7	Mist	7	Heavy sea.
28	N.W., etc...	8	Violent ..	8	Fog	8	Very heavy.
32	N., etc. ..	9	Storm ..	9	Storm	9	Violent.

INDIA.

Information regarding weather is distributed twice daily by the Calcutta, Rangoon and Karachi stations at 1 a.m. and 1 p.m. *Indian Standard time*, (*i.e.* 5½ hours in advance of Greenwich). The stations at Bombay, Madras and Port Blair, transmit similar information at 1.10. a.m. and 1.10 p.m. *Indian Standard time.*,

JAPAN.

The Japanese coast station of Choshi transmits on the wave-length of 600 metres each night, except Sunday, the mean time of Central Japan (time of the meridian 135° E), as follows :—

From 8.59′ 00″ to 8.59′ 55″ — — — — — — — — — — —, etc.
,, 9.00′ 00″ ,, 9.00′ 01″ —
,, 9.00′ 30″ ,, 9.00′ 55″ —.—.—.—.—.—.—, etc.
,, 9.01′ 00″ ,, 9.01′ 01″ —
,, 9.01′ 30″ ,, 9.01′ 55″ —..—..—..—..—.., etc.
,, 9.02′ 00″ ,, 9.02′ 01″ —
,, 9.02′ 30″ ,, 9.02′ 55″ —...—...—...—... , etc.
,, 9.03′ 00″ ,, 9.03′ 01″ —
,, 9.03′ 30″ ,, 9.03′ 55″ —....—....—....—, etc.
,, 9.04′ 00″ ,, 9.04′ 01″ —

For warnings issued to ships at sea see note 252 on page 455.

MEXICO.

The coast station of Campeche, Guaymas, Mazatlan de Sinaloa, Payo Obispo and Vera Cruz transmits the time of the meridian of Tacubaya (3h. 36m. 46·67secs. behind Greenwich) daily at noon in the following manner :—

From 11.55 a.m. to noon : repeated transmission of the inquiry signal "CQ"; then repeated transmissions of the signal "XH" (time of Tacubaya);

At noon : transmissions of the word "noon," always followed by a free announcement of the state of the weather.

SOUTH AFRICA.

The radiotelegraphic stations at Capetown (Slangkop) and Durban signal at 1 o'clock in the afternoon of each day weather reports containing information relative to the meteorological conditions affecting the coastal belt of the South African Union.

The arrangements made in the Union of South Africa for the transmission of radio time signals for the use of shipping in South African waters is as follows :—

A special clock at the Royal Observatory, Capetown, is adapted to give automatically a series of signals of a distinctive character extending over an interval of half a minute. The clock is brought into conformity daily with the observatory standards shortly before the hour selected for transmitting the signals. The hour chosen is 11 p.m., Union standard time (9 p.m. Greenwich mean time).

The time signal is preceded by the usual warning signal from the radio coast station. The time signal proper consists of twelve dashes, each of about ¾ of a second in duration, in five groups, commencing at the following Greenwich mean times :—

Group I.			*Group II.*			*Group III.*			*Group IV.*			*Group V.*		
h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.	h.	m.	s.
8	59	30	8	59	38	8	59	44	8	59	48	8	59	54
—	—	32	—	—	40	—	—	—	—	—	50	—	—	56
—	—	34												58
												9	0	0

The beginning of the last dash corresponding exactly with 9 p.m. Greenwich or 11 p.m. South African standard time.

By means of a special relay, the time signal is simultaneously transmitted to Slangkop (Capetown) and Durban radio stations, the signal to the latter station passing over the land telegraph wire connecting Capetown and Durban, a distance of about 1,100 miles.

SPAIN.

The following message, intended to supplement the Eiffel Tower reports by more detailed information from Spanish stations, is signalled from the Spanish Wireless Station at Carabanchel, Madrid (Call letter E.G.C.) on a wave length of 2,000 metres.

At 1 h. 29 min. G.M.T. for 50 seconds the letters C M A.

At 1 h. 30 min. G.M.T. the letters E O C M (Espana Observatorio Central Meteorologico) ; followed by :—

(1) Five groups of 8 figures, each preceded by a letter indicating the place to which the observations refer. The code, aaaddfcm, used in these groups is identical with that of the similar groups in the Eiffel Tower message (see above). The stations and hours for which information is given are :—F, Funchal 7 a.m. ; L, La Laguna (Teneriffe) 8 a.m. ; O, Oran (Algeria) 7 a.m. ; Li, Lisbon 9 a.m. ; Mh., Mahon (Balearic Islands) 8 a.m.

(2) Seven groups of 10 figures, each preceded by a letter to identify the place of observation. The groups are coded aaab′a′a′dd fc, where the letters have the same significance as in the Eiffel Tower messages, and b′a′a′ signifies the change of the barometer since 8 a.m. If the barometer has risen b′=0, if it has fallen b′=5, a′a′ gives the amount of

the change in millimetres and tenths, thus 522 indicates a fall of 2.2 millimetres.

The observations are taken at noon. The reporting stations are: B, Barcelona; A, Alicante; Ml, Malaga; Sf, San Fernando; H, Huelva; C, Corunna; Md, Madrid.

(3) A group of 12 figures, ddfddfddfddf, giving the direction (dd) and force (f) of the wind at 250, 500, 1,000 and 1,500 metres above the ground at Madrid.

(4) A group of 9 figures giving the sea disturbance on the following sections of the coast:—(1) San Sebastian to Santander, (2) Santander and Cape Ortegal, (3) Cape Ortegal to the Portuguese frontier, (4) Huelva to Gibraltar, (5) Gibraltar to Almeria, (6) Almeria and Valencia, (7) Valencia and the French frontier, (8) the Balearic Islands, (9) Algerian coast.

(5) A group of 11 figures, giving weather forecasts.

(6) A group or groups giving the position of the centres of atmospheric disturbances.

UNITED STATES.

Through co-operation with local offices of the United States Weather Bureau, weather forecasts are sent broadcast to sea through naval coast radio stations at certain times, varying with the locality. Coast stations are generally prepared to give local forecasts to passing vessels without charge, on request. Storm warnings are sent whenever received, and the daily weather bulletins are distributed by the naval radil stations at Washington, D.C. and Key West, Fla., a few minutes after the 10 p.m. time signal. These bulletins consist of two parts.

The first part contains code letters and figures which express the actual weather conditions at 8 p.m., seventy-fifth meridian time, on the day of distribution, at certain points along the eastern coast of North America, one point along the Gulf of Mexico, and one at Bermuda.

The second part of the bulletin contains a special forecast of the probable winds to be experienced a hundred miles or so off shore, made by the United States Weather Bureau, for distribution to shipmasters. The second part of the bulletin also contains warnings of severe storms along the coasts, as occasions for such warnings may arise.

Immediately following this bulletin, a weather bulletin for certain points along the Great Lakes is sent broadcast by the naval radio station at Washington, D.C., consisting of two parts. The first part contains code letters and figures which express the actual weather conditions at 8 p.m., seventy-fifth meridian time, on the day of distribution, at certain points along the Lakes. The second part of the bulletin contains a special forecast of the probable winds to be experienced on the Lakes, during the season of navigation—about April 15th to December 10th.

The points for which weather reports are furnished are designated as follows: For Atlantic coast and Gulf points S=Sydney, T=Nantucket, DB=Delaware Breakwater, H=Hatteras, C=Charleston, K=Key West, P=Pensacola, and B=Bermuda; for points on the Great Lakes, Du=Duluth, M=Marquette, U=Sault Ste. Marie, G=Green Bay, Ch=Chicago, L=Alpena, D=Detroit, V=Cleveland, and F=Buffalo.

All bulletins begin with the letters U. S. W. B. (United States Weather Bureau), and the weather conditions follow. The first three figures of a report represent the barometric pressure in inches (002=30.02); the next figure, the fourth in sequence, represents the direction of the wind to the eight points of the compass: 1=north, 2=north-east, 3=east, 4=south-east, 5=south, 6=south-west, 7=west, 8=north-west, and 0=calm. The fifth figure represents the force of the wind on the Beaufort Scale given below:—

BEAUFORT SCALE OF WIND FORCE.*

Number and designation.	Statute miles per hour.	Nautical miles per hour.
0 Calm	0 to 3	0 to 2.6
1 Light air	8	6.9
2 Light breeze	13	11.3
3 Gentle breeze	18	15.6
4 Moderate breeze	23	20.0
5 Fresh breeze	28	24.3
6 Strong breeze	34	29.5
7 Moderate gale	40	34.7
8 Fresh gale	48	41.6
9 Strong gale	56	48.6
10 Whole gale	65	56.4
11 Storm	75	65.1
12 Hurricane	90 and over.	78.1 and over

* For the modern Beaufort Scale as used in England see pp. 852-3.

In order to simplify the code no provision has been made for wind force greater than 9, strong gale, on the Beaufort Scale. Whenever winds of force greater than 9 occur, the number representing them is given in words instead of figures—thus: Ten, eleven, etc.

EXAMPLES OF CODE.

U S W B S 96465 T 91674 DB 94686 H 99886 C 01214 K 02622 P 03613 B 00065.

Translation.

United States Weather Bureau.

Station.	Pressure.	Wind. Direction.	Wind. Force.†
Sydney	29.64	SW	5
Nantucket	29.16	W	4
Delaware Breakwater	29.46	NW	6
Hatteras	29.98	NW	6
Charleston	30.12	N	4
Key West	30.26	NE	2
Pensacola	30.36	N	3
Bermuda	30.00	SW	5

† See Beaufort Scale above.

U S W B Du 95826 M 97635 U 00443 G 96046 Ch 95667 L 00644 D 00842 V 01054 F 01656.

Translation.

United States Weather Bureau.

Station.	Pressure.	Wind.	
		Direction.	Force.*
Duluth	29.58	NE	6
Marquette	29.76	E	5
Sault Ste. Marie	30.04	SE	3
Green Bay	29.60	SE	6
Chicago	29.56	SW	7
Alpena	30.06	SE	4
Detroit	30.08	SE	2
Cleveland	30.10	S	4
Buffalo	30.16	S	6

* See Beaufort Scale on opposite page.

The naval radio station at Great Lakes, Ill., transmits a weather report at 10 a.m. and 10 p.m., ninetieth meridian time, daily, on a wave-length of 1,512 meters. This bulletin is similar to the second bulletin sent out by the Washington Station, and is for the States of Illinois, Missouri, Iowa, Minnesota, North Dakota, South Dakota, Nebraska, Kansas, Wisconsin, and also for the upper lakes. Storm warnings are sent out as soon as received and broadcasted every four hours the next day.

TRANSMISSION OF TIME SIGNALS AND HYYDROGRAPHIC INFORMATION BY NAVAL RADIO STATIONS.

The transmission of time signals to vessels at sea by means of radiotelegraphy was first accomplished in the United States in 1905, and this service, enlarged and extended, has continued to the present time. This service is of the greatest value to mariners, as it furnishes a means by which the time, as given by the transmitted signals, may be compared with a ship's chronometer and the error of the chronometer found. Similar comparisons over a number of days enable data to be obtained by which not only the error may be found but also the chronometer rate; that is, the rate at which it is gaining or losing.

The noontime signals on the Atlantic coast are sent out through the coast radio stations by connection with Western Union Telegraph lines from the United States Naval Observatory at Washington, D.C. By the operation of proper relays in electrical circuits, the beats of the seconds of a standard clock in the observatory are sent out broadcast as a series of radio dots, commencing five minutes before the time of the final signal. By omitting certain dots in a series, the comparison between the dots and the beats of the chronometer seconds can be checked until the instant of local noon (seventy-fifth meridian time) is reached. This is marked by a longer dot, which gives the time of exact noon. A comparison with the chronometer time at that instant gives its error referred to the seventy-fifth meridian time. Applying the difference in longitude, namely, five hours, between the seventy-fifth meridian and Greenwich, which is the standard meridian (or 0° longitude), the error of the chronometer referred to Greenwich time is determined.

Time signals are now sent out on the Atlantic coast only through the radio stations at Washington (NAA), Key West (NAR), and New Orleans (NAT). Signals from Washington and Key West are sent out every day in the year twice a day, viz from 11.55 a.m. to noon and from 9.55 to 10 p.m., seventy-fifth meridian time. Time signals from New Orleans are sent out daily, including Sundays and holidays, commencing at 11.55 a.m., seventy-fifth meridian standard time, and ending at noon.

In case of failure of the Washington high-power station, the signals are sent out by the small set in the same station, and the stations at Boston, Newport, New York, Norfolk, and Charleston are notified, and they each send the signals broadcast.

On the Pacific coast the time signals are sent broadcast to sea through the naval radio stations at San Francisco (NPH), Eureka (NPW), Point Arguello (NPK), and San Diego, Cal. (NPL), and at North Head, Wash. NPE). The controlling clock for each station is in the naval observatory at the Mare Island Navy Yard. Signals from San Francisco are sent out every day from 11.55 to noon, and from 9.55 to 10 p.m., one hundred and twentieth meridian standard time. Those from North Head, Eureka, Point Arguello, and San Diego are sent out daily, excluding Sundays and holidays, from 11.55 to noon, one hundred and twentieth meridian standard time.

On the Great Lakes the time signals are sent broadcast through the naval radio station at Great Lakes, Ill. (NAJ), daily from 10.55 a.m. to 11 a.m., ninetieth meridian standard time.

To get the maximum clearness of signals, the receiving circuit should be tuned to that of the sending station. Washington and San Francisco send on a 2,500-meter wave length, North Head and San Diego on a 2,000-meter wave length, Eureka on a 1,400-meter wave length, Great Lakes on a 1,512-meter wave length, Key West and New Orleans on a 1,000-meter wave length, and Point Arguello on a 750-meter wave length.

Information concerning wrecks, derelicts, ice, and other dangerous obstructions to navigation, whenever received from the Hydrographic Office or from a branch hydrographic office or other reliable source, is sent broadcast four times daily, viz, at 8 a.m., noon, 4 p.m., and 8 p.m., local (standard) time of station. Ships within range of a naval radio station should be prepared to receive these hydrographic messages at the hours mentioned and should avoid sending radio messages at these times. One vessel sending may prevent several others receiving information necessary to their safety.

Naval radio stations will furnish this information to passing vessels on request, whenever practicable, at other hours than those mentioned above. Should it not be practicable to send out this information on one of the hours scheduled it will be held until the next scheduled time and sent out as soon as practicable after each hour scheduled.

Each night at 10 o'clock, seventy-fifth meridian, immediately following the time signal, the naval radio station at Washington, D.C., will broadcast such information relating to safe navigation as may be furnished it by the Hydrographic Office during the preceding 24 hours. The same wave length, 2,500 metres, used in the time signal will be employed.

PARTICULARS OF WIRELESS TELEGRAPH PATENTS IN 1916

THOUGH far from reaching the pre-war standard, the number of applications filed during the past year is few short of eighteen thousand seven hundred. Applications with reference to Wireless Telegraphy and Telephony, however, have exceeded by fifty the total number of similar applications filed in the year of peace 1913, making in all one hundred and ninety applications. Due allowance must be made for the many specifications having an electrical basis; which, though not specifically "wireless," yet have a "wireless" reference.

As, at the moment of writing, the completed records are not available it is not possible to give a definite status to any fixed number of applications; but the records at present show some ten applications to have been abandoned before completion; eleven to have been accepted previous to sealing; and three to have been definitely sealed. Of those applications recorded in the year-book for 1916, as unaccepted or unsealed, eighteen have, during the past year, been accepted ready for sealing, and fourteen have been sealed; of the pending applications, fifteen have been definitely abandoned and eight have become void through non-acceptance within the stipulated period. But as the temporary Act is still in force, the time for fulfilling the formalities may be extended indefinitely, and consequently none of these decisions may be taken as final. There has been an increase, this past year, in Convention applications, all of which have been thrown open to Public inspection previous to acceptance. The United States leads the way with twenty applications, France follows with fourteen, Germany sends three, Italy and Sweden have two each, and Holland and Japan have one each.

In the early months of the war a large increase in void patents was anticipated, especially patents standing in the names of enemy patentees, by reason of the obstacles that seemed to impede the timely payment of renewal fees, and the carrying out of workings. With regard to renewals, an understanding has been come to by which fees on both sides may be paid as usual, and are held in trust against the close of hostilities, when a reciprocity arrangement will be inaugurated.

The Working Laws have been met by a system of compulsory licences under which an enemy patent may be worked by a British Firm on payment of a royalty, all such royalties being held in trust for the patentee by the Public Trustee. The Board of Trade have also arranged to accept from licencees the customary fees for the renewal of the life of the patent in the usual way, the total amount of which may be deducted from any royalties payable under the licence to work. A similar arrangement exists in enemy countries, and in the observance of the etiquette of Patent Law the Germans have been strangely consistent in view of their seeming abandonment of regard for other laws. They have even extended, by an informal three or six months, the time in which renewal fees might be paid or workings carried out.

Many British manufacturing firms have taken advantage of this compulsory licence arrangement; but it is a strong testimony to the

status of the Marconi system of wireless telegraphy and telephony, that the Marconi Company have not found it necessary to apply for a licence for the use of any of the enemy patents so frequently cited before the war as valuable improvements; on the other hand, no sooner was this working arrangement proclaimed in Germany than there were numerous applications by German firms for the use of Marconi patents.

France has overcome the working difficulty by definitely suspending the Working Laws during the period of the war, and Belgium—surrendering doubtless to necessity—has followed the example of France. Certain new laws are pending in South American Republics, and it has already been proclaimed in Chili that patents for inventions which, in the opinion of the Government Expert, are improvements or enlargements of inventions covered by an existing patent shall be granted only after disclosure, to and with the consent of the inventor of the existing patent.

In other parts of the world, patent affairs have progressed. In South Africa, a new law was promulgated, including the four colonies of the Cape, Orange River, Natal and Transvaal under one Patent. This will obviate many of the former difficulties, particularly as to renewal fees and workings. Under the new system, one Patent will issue for the Union of South Africa, renewable at the end of the third, seventh and tenth years, at an inclusive fee of £20.

Wireless Telegraph Patents still continue to provide ample matter for litigation, especially in the United States, where the value and priority of the Marconi Patents has once more been confirmed in the decision of Judge Mayer in the action of the American Marconi Co. against the De Forest Radio Telephone & Telegraph Co. upon the "Fleming" valve.

There are at present pending twelve actions by the American Marconi Company against infringers in the United States, and one in Spain brought by the Spanish Marconi Company.

BRITISH APPLICATIONS

Number. **Date.** **Patentee and Description.**

88 Jan. 3.—S. SALTO—Apparatus for concentrating and projecting radiant energy.

245
246& Jan. 6.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and
247 G. M. WRIGHT—Receivers for wireless signals. (*Accepted.*)

339 Jan. 7.—W. J. MELLERSH-JACKSON (*for A. Arbib.*)—Radiotelegraphic apparatus. (Patent No. 100384. *Sealed.*)

372 Jan. 8.—G. CONSTANTINESCU and W. HADDON. Transmission of energy. (*Application abandoned.*)

417 Jan. 10.—INTERNATIONAL ELECTRIC CO. and R. G. LENOIR. Transmitters or microphones.

465 Jan. 11.—BRITISH THOMSON-HOUSTON CO. and F. P. WHITAKER. Electric rotary converters.

471 Jan. 11.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and C. S. FRANKLIN. Electrical condensers. (Patent No. 102997. *Accepted.*)

Photo by] [*Pirie MacDonald.*

JOHN L. HOGAN, JUN., VICE-PRESIDENT OF THE INSTITUTE OF RADIO ENGINEERS, U.S.A.

(*For whose Biographical Notice see page* 882.)

599 Jan. 13.—E. J. CLOSE and C. F. ELWELL. Radio receiving circuits. (Patent No. 103004. *Accepted.*)

681 Jan. 15.—BRITISH THOMSON-HOUSTON CO. and P. C. WHITAKER. Alternating current electrical apparatus. (Patent No. 103317. *Accepted.*)

731 Jan. 21.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and C. S. FRANKLIN. Wireless telegraph transmitters.

732 Jan. 21.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and W. S. ENTWISTLE. Wireless telegraph transmitters.

1097 Jan. 24.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and R. D. BANGAY. Lock nuts for aeroplane wireless installations. (Patent No. 101360. *Sealed.*)

1143 Jan. 25.—F. N. LANCHESTER. Generator for electric oscillations or for alternating currents of high frequency. (*Application abandoned.*)

1189 Jan. 25.—WESTERN ELECTRIC CO. and G. H. NASH. Telephone receiving apparatus for aviators. (Patent No. 103341. *Accepted.*)

1481 Jan. 31.—E. GIRARDEAU. Make and break switches. (Convention application, France, Jan. 29, 1915. Patent No. 100042. *Accepted.*)

1595 Feb. 2.—R. C. GALLETTI and GALLETTI'S WIRELESS TELEGRAPH & TELEPHONE CO., LTD. Transmitting apparatus for wireless signals. (Patent No. 102400. *Accepted.*)

1597 Feb. 2.—E. GIRARDEAU and J. BETHENOD—Radio-telegraphy. (Convention application, France, Feb. 2, 1915. Patent No. 100058. *Accepted.*)

1705 Feb. 4.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Means for controlling alternating currents.

1825 Feb. 7.—J. GELL—Electric arc generators for high-frequency oscillations. (*Application abandoned.*)

1827 Feb. 7.—BASIL BINYON—Apparatus for wireless telegraphy.

1861 Feb. 8.—M. B. RODRIGUEZ—Syntonisation, by frequency, of groups of electro-magentic waves.

2065 Feb. 11.—E. GIRARDEAU and J. BETHENOD—Radio-telegraphy. (Convention application, France, Feb. 11, 1915. Patent No. 100075. Addition to No. 100058. *Accepted.*)

2066 Feb. 11.—E. R. CLARKE—Wireless telegraphy.

2329 Feb. 16.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Means for producing alternating currents.

2402 Feb. 17.—A. ARTOM—Signalling by electro-magnetic waves.

2524 Feb. 19.—T. B. DIXON—Transformation of motion into electric waves or impulses. (Convention application, United States, July 19, 1915. Patent No. 100940. *Open to inspection.*)

2598 Feb. 21.—Ettore Bellini—Device for generating, in an aerial for wireless telegraphy and telephony electrical oscillations of a strictly single frequency.

2639 Feb. 22.—British Thomson-Houston Co., Ltd. (*General Electric Co., U.S.A.*)—Means for amplifying electrical variations.

2861 Feb. 25.—Marconi's Wireless Telegraph Co., Ltd., and F. P. Swann—Receivers for wireless signals.

2922 Feb. 28.—M. J. Webb—Oscillatory machines. (*Application abandoned.*)

2976 Feb. 28.—G. Constantinescu and W. Haddon—Variable capacity for wave transmission systems. (*Application abandoned.*)

3036 Feb. 29.—British Thomson-Houston Co., Ltd., and — Shuttleworth—Polyphase alternating current commutator machines.

3164 March 2.—Marconi's Wireless Telegraph Co., Ltd., and H. A. Ewen—Means for suspending and insulating electrical conductors.

3165 March 2.—Marconi's Wireless Telegraph Co., Ltd., and H. M. Dowsett—Studs or electrodes of electric dischargers.

3166 March 2.—Improvements in wireless installations for aeroplanes.

3233 March 3.—Marconi's Wireless Telegraph Co., Ltd., and H. A. Ewen—Improvements in measuring instruments, relays, and the like. (Cognate application with No. 13852/15 *Accepted.*)

3391 March 7.—British Thomson-Houston Co., Ltd. (*General Electric Co., U.S.A.*)—Vacuum apparatus.

3515 March 9.—Electron discharge devices.

3603 March 10.—Means for obtaining high vacua.

3533 March 9.—Signal Gesellschaft m.b.H.—Multiple contact microphones. (Convention application, Germany, Jan 9, 1915. Patent No. 100156. *Accepted.*)

3743 March 13.—M. Compare and The Comparri Wireless Control Syndicate—Oscillators or vibrators for wireless telegraphy. (*Application abandoned.*)

3745 March 13.—Soc. Française Radio-Electrique—Alternators for the production of high-frequency electric oscillations. (Convention application, France, March 13, 1915. Patent No. 100184. *Accepted.*)

3789 March 14.—Marconi's Wireless Telegraph Co., Ltd., and H. A. Ewen—Improvements in measuring instruments, relays, and the like. (Cognate application with No. 13852/15. *Accepted.*)

3948 March 17.—F. Titterton—Apparatus for transmitting signals.

4096 March 20.—H. Rottenburg—Electric contact keys and buzzers. (*Application abandoned.*)

4184 March 21.—W. A. Clark, H. G. and W. W. Longford, T, Morris, and The Sphinx Manufacturing Co.—Electrical condenser and condenser systems.

4247 March 22.—British Thomson-Houston Co., Ltd. (*General Electric Co., U.S.A.*)—Electric transformers.

4295 March 23.—E. R. Clark—Inductances for wireless telegraphy and method of manufacture thereof.

4320 March 23.—A. E. McColl—Protecting gear for electric circuits.

4321 March 23.—Means for protecting alternating current generators and transformers.

4399 March 24.—British Thomson-Houston Co., Ltd. (*General Electric Co., U.S.A.*)—Method of controlling mechanism for electric circuits.

4558 March 28.—Electric discharge apparatus. (Patent No. 103046. *Accepted.*)

4697 March 28.—Electric oscillators. (Patent No. 103047. *Accepted.*)

4518 March 27.—A. Artom—Receiving instrument for wireless telegraphy.

4733 March 31.—A. E. McColl—Alternating current system.

4816 April 1.—British Thomson-Houston Co., Ltd. (*General Electric Co., U.S.A.*)—Wireless signalling systems.

4959 April 5.—Lee de Forest—Electrical means for producing musical notes. (Convention application, United States, April 24, 1915. Patent No. 100358. *Accepted.*)

5111 April 5.—C. P. Ryan—Sound receiving apparatus.

5202 April 19.—Allmanna Svenska Elektriska Aktiebolaget—Continuous current generator. (Convention application, Sweden, May 5, 1915. Patent No. 100394. *Sealed.*)

5445 April 13.—E. C. R. Marks (*Goldberg*).—Electrical control apparatus.

5458, 5466 & 5471 April 13.—Soc. Française Radio-Électrique—Wireless telegraph and telephony. (Convention applications, France, Dec. 28, 1914, March 1 and 9, 1915. Patent Nos. 100281, 100282, 100283. *Open to inspection.*)

5631 & 5634 April 17.—R. F. Bossini—Sound detector. H. R. Wilding—Sound transmitter.

5809 April 20.—A. H. Dykes, W. Duddell, H. W. Hanscock, and C. Oliver—Distance operated mechanics and signals connected to electrical supply systems.

6329 May 3.—R. D'Antonio—Telegraphic transmission devices. (Patent No. 102214. *Accepted.*)

6256 May 3.—J. Hettinger—Aerial conductors for wireless telegraphy.

6700 May 10.—J. T. Morris and A. F. Sykes—Means for locating subaqueous sounds.

6998 May 16.—W. A. SOLOMONS—Systems of wireless telegraphy and telephony. (*Application abandoned.*)

7088 May 18.—F. ROSSO—Systems of radio-telegraphy for multiple simultaneous transmission. (Convention application, Italy, May 18, 1915. Patent No. 100495. *Open to inspection.*)

7456 May 25.—S. FORD and A. F. SYKES—Electro-chemical microphone for wireless telegraphy and telephony. (*Application abandoned.*)

7488 May 26.—W. H. BRAGG—Apparatus for determining direction of sounds in water.

7543 May 27.—C. M. BOSTOCK and R. N. COKE—Morse signalling for aircraft. (*Application abandoned.*)

8011 June 6.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Wireless signal systems. (*Application abandoned.*)

8042 June 7.—I. J. TRIM—Ear protectors for wireless telegraphic head receivers.

8303 June 12.—T. B. DIXON—Transformation of motion into electrical waves or impulses. (Convention application, United States, July 19, 1915. Patent No. 100942. *Open to inspection.*)

8633 June 19.—BRITISH WESTINGHOUSE ELECTRICAL MANUFACTURING CO.—Alternating-current commutator. (Convention application, United States, June 19, 1915. Patent No. 100743. *Accepted.*)

8845 June 23.—C. H. BURDON (*for Siemens and Halsk A.G.*)—Electro-magnetic relays.

9076 June 28.—H. MUNRO—Means for determining direction from which sound proceeds and distance at which it originates.

9105 June 29.—F. G. SIMPSON—Electric spark-gap. (Convention application, United States, March 20, 1915. Patent No. 100795. *Open to inspection.*)

9152 June 29.—W. R. HERION—Portable apparatus for producing and transmitting waves for wireless telegraphy. (*Application abandoned.*)

9165 June 29.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and G. M. WRIGHT—Speed control of electric motors.

9246 June 29.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and H. A. EWEN—Improvements in extensiometers, ammeters, measuring instruments, and the like.

9333 July 3.—F. MURGATROYD—Continuous wave dynamo electric machines.

9349 July 3.—LEE DE FOREST—Wireless telephony. (Convention application, United States, July 3, 1915. Patent No. 100841. *Accepted.*)

9537 July 6.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and I. SHOENBERG—Frequency measuring instrument for electric currents.

9649 July 8.—G. CONSTANTINESCU and W. HADDON—Transmission of energy by wave motion.

9766 July 11.—BRITISH THOMSON-HOUSTON CO—Regulators for polyphase transmission.

9812 July 12.—BRITISH THOMSON-HOUSTON CO.—Systems of polyphase transmission.

9833 July 12.—INDO-EUROPEAN TELEGRAPH CO., A. H. MORSE, and H. RIVERS-MOORE—Electric oscillating or wireless system and apparatus.

9927 July 14.—BRITISH WESTINGHOUSE ELECTRICAL MANUFACTURING CO.—Production of asymmetric potential waves. (Convention application, United States, July 15, 1915. Patent No. 100893. *Open to inspection.*)

9937 July 14.—M. BRESLAUER—Dynamo electric power transmission apparatus of unipolar type. (Convention application, Germany, July 10, 1914. Patent No. 100894. *Accepted.*)

9938 July 14.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Protection of electric transmission systems.

10008 July 17.—I. CHORTIK—Method of producing high-frequency oscillations.

10103 July 18.—I. CHORTIK—Generation of high-frequency currents.

10096 July 18.—E. GIRARDEAU and J. BETHENOD—Spark-gaps for wireless telegraphy. (Convention application, France, July 21, 1915. Patent No. 100957. *Open to inspection.*)

10122 July 18.—LEE DE FOREST—Oscillating audions. (Convention application, United States, July 22, 1915. Patent No. 100959. *Accepted.*)

10176 July 19.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and R. H. WHITE—Means for opening and closing electrical circuits.

10205 July 20.—J. PEDERSON—Power generating and transmitting systems.

10227 July 20.—A. E. MCCALL—Protective device for alternating current electric systems.

10335 July 22.—WESTERN ELECTRIC CO.—Improvements in ionization devices for amplifying electric currents. (Patent No. 102589. *Accepted.*)

10558 July 26.—G. O. SQUIER and I. COHEN—System of electrical signalling. (Patent No. 103771. *Accepted.*)

10576 July 26.—E. GIRARDEAU and J. BETHENOD—Wireless telegraphy and telephony. (Convention application, France, Aug. 10, 1915. Patent No. 101148. *Open to inspection.*)

10672 July 27.—H. K. HARRISS—Transmitting apparatus.

10713 July 28.—E. R. CLARKE, S. R. MULLARD, and THE EDISWAN ELECTRIC LIGHT CO., LTD.—Valves for receiving or producing wireless current.

10722 July 29.—I. CHORTIK—Means for producing high-frequency oscillations.

10850 Aug. 1.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Electron discharge apparatus.

10905 Aug. 2.—BRITISH THOMSON-HOUSTON CO., LTD., and R. C. CLINKER—Wireless transmitting system.

10936 Aug. 2.—J. GRONVALL—Controlling and reversing mechanism for valves.

10981 Aug. 3.—J. T. MORRIS and A. F. SYKES—Means for locating subaqueous sounds.

10985 Aug. 3.—R. A. FESSENDEN—Apparatus for transmitting and receiving sound waves through the ground. (Convention application, United States, Oct. 7, 1915. Patent No. 101968. *Open to inspection.*)

10999 Aug. 3.—W. CROSSMAN (*for Svenska Aktiebolaget Gas Accumulator*)—Detectors for wireless telegraphy.

11055 Aug. 4.—INDO-EUROPEAN TELEGRAPH CO., LTD., and A. H. MORSE—Electric oscillating or wireless system and apparatus.

11130 Aug. 7.—I. CHORTIK—Method of producing high-frequency oscillations.

11242 Aug. 9.—INDO-EUROPEAN TELEGRAPH CO., LTD., and A. H. MORSE—Method of controlling electric circuits from a distance.

11337 Aug. 11.—I. WILLIAMS—Ammeter for measuring of alternating current and electric oscillations.

11368 Aug. 11.—M. W. W. MACKIE—Alternators for high frequencies.

11807 Aug. 19.—R. G. GILLMOR and SPERRY GYROSCOPE CO.—Method of producing electrical oscillations.

11804 Aug. 19.—A. ROLFE—Varying the frequency of alternating electric currents.

12033 Aug. 24.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and J. ST. VINCENT PLETTS—Apparatus for wireless telegraphy.

12157 Aug. 28.—G. CONSTANTINESCU and W. HADDON—Variable capacity for liquid wave transmission systems.

12160 Aug. 28.—BRITISH WESTINGHOUSE ELECTRICAL MANUFACTURING CO.—Vapour electric converters. (Convention application, United States, Aug. 28, 1915. Patent No. 101346. *Open to inspection.*)

12305 Aug. 30.—K. T. WANG—Apparatus for converting or transforming electric currents.

12395 Sept. 1.—A. U. SARNMARK—Means for operating apparatus at receiving station from sending station by electric impulses. (Convention application, Sweden, Sept. 7, 1915. Patent No. 101411. *Open to inspection.*)

12505 Sept. 4.—LEE DE FOREST—Radio-telephonic transmitting system. (Convention application, United States, Sept. 4, 1915. Patent No. 101415. *Open to inspection.*)

12609 Sept. 6.—M. TOCCHIO—Wireless control systems.

12710 Sept. 7.—C. D. J. DUNNING—Aerial for wireless telegraph and telephone systems.

12985 Sept. 13.—M. PUPIN—Art of electrical tuning. (Convention date, United States, Sept. 15, 1915. Patent No. 101540. *Open to inspection.*)

12986 Sept. 13.—E. H. ARMSTRONG and M. I. PUPIN—Electric wave
12987 & transmission. (Convention application, United States,
12988 Sept. 17, 1915. Patent No. 101541. *Open to inspection.*) Wireless systems, etc. (Convention application, United States, Oct. 1, 1915. Patent No. 101702. *Open to inspection.*) Transmission of electrical signals. (Convention application, United States, Feb. 10, 1916.)

13071 Sept. 14.—T. H. NAKKEN—Device for closing contacts by wireless telegraphy. (Convention application, Holland, Sept. 15, 1915. Patent No. 101480. *Open to inspection.*)

13269 Sept. 19.—G. O. SQUIER, L. W. AUSTIN, and L. COHEN—Electrical signalling.

13279 Sept. 19.—J. F. SEPULCHRE—Production of electrical current.

13303 Sept. 19.—F. G. SIMPSON—Transmitting apparatus for radio-telegraph and radio-telephone station.

13304 Sept. 19.—SOC. ANON. ÉTABLISSEMENTS DE DION-BOUTON—High-tension electrical current collecting and transmitting or conducting devices. (Convention application, France, Nov. 8, 1915. Patent No. 102140. *Open to inspection.*)

13382 & Sept. 20.—R. WHIDDINGTON—Multiple vacuum valve.
13383 Vacuum tube.

13439 Sept. 21.—J. F. SEPULCHRE—Production of electric currents.

13661 Sept. 26.—SOC. ANON. DES ATELIERS BRILLÉ FRÊRES—Electric apparatus for transmitting movements at a distance. (Convention application, France, Sept. 28, 1915. *Open to inspection.*)

14038 & Oct. 3.—G. CONSTANTINESCU and W. HADDON—Signalling
14039 by liquid wave transmission. High-frequency fluid wave transmission generator.

14028 Oct. 3.—E. M. TIGERSTEDT—Relay for undulatory currents.

14005 & Oct. 3.—D. MCLENNAN—Means for detecting sounds.
14006 Diaphragm for sound transmitting and receiving instruments.

14031 Oct. 3.—M. INOUE—Wireless electric circuit controlling apparatus. (Convention application, Japan, May 11, 1916.)

14250 Oct. 6.—R. A. FESSENDEN—Sound producing and transmitting apparatus. (Convention application, United States, Jan. 27, 1916.)

15325 Oct. 9.—J. R. BEARD and ELECTRIC IMPROVEMENTS, LTD.—Protecting devices for multiphase alternating current apparatus.

14355 Oct. 9.—SUBMARINE WIRELESS CO.—Sound operated circuit controller. (Convention application, United States, May 19, 1916.)

14546 Oct. 12.—WESTERN ELECTRIC CO.—Duplex circuits. (Convention application, United States, Oct. 13, 1915. Patent No. 101805. *Open to inspection.*)

14767 Oct. 17.—BRITISH WESTINGHOUSE ELECTRICAL MANUFACTURING CO.—Vacuum type inverted converters. (Convention application, United States, Nov. 29, 1915. Patent No. 102484. *Open to inspection.*)

14842 Oct. 19.—D. K. MORRIS, W. P. TRITTON, and W. G. WILSON—Electrical apparatus controlled from a distance.

14850 Oct. 19.—T. CHALMERS—Sound producing and transmitting instrument.

14930 Oct. 20.—D. F. COMSTOCK—Method of, and apparatus for, controlling electric arcs. (Convention application, United States, Oct. 20, 1915. Patent No. 101885. *Open to inspection.*)

14949 Oct. 20.—S. OULIANINE—Transmitting apparatus for electric
14957 & signalling. Electric relays. Automatically controlled
14960 relay commutator.

14983 Oct. 21.—A. W. SHARMAN—Electric signalling systems.

15072 Oct. 23.—J. BIGUET and M. PERI—Vacuum tube of the "Audion" type. (Convention application, France, Oct. 23, 1915. Patent No. 101974. *Open to inspection.*)

15187 Oct. 25.—T. R. RENFREE and THE BRITISH ELECTRIC TRANSFORMER CO.—Transformers.

15274 Oct. 26.—J. BETHENOD—Generation of sustained electrical oscillations for wireless telegraphy and telephony. (Convention application, France, Nov. 5, 1915.)

15339 Oct. 27.—B. J. CORDER—System of multiplex wireless telegraphy.

15358 Oct. 27.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A*)—Wireless signalling systems.

15486 Oct. 30.—Wireless telephone systems.

15543 Oct. 31.—SOC. FRANÇAISE RADIO-ÉLECTRIQUE—Electrical circuit controlling device. (Convention application, France, Nov. 11, 1915. Patent No. 102148. *Open to inspection.*)

15547 Oct. 31.—Radio-telegraphy and telephony (Convention application, France, Dec. 8, 1915.)

15675 Nov. 2.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Wireless telephone system.

15781 Nov. 4.—Protective devices for electric circuits.

16005 Nov. 8.—R. E. GILLMOR (*Sperry Gyroscope Co.*)—Means for transmitting directive movements.

16453. Nov. 16.—J. JACOBSON and BARUCH ELECTRIC CONTROLLER CORPORATION—Protective devices for electric currents.

16563 Nov. 18—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Wireless signalling systems. (Patent No. 102709. *Accepted.*)

16737 Nov. 22.—F. G. SIMPSON—Radio-telegraph and radio-telephone stations.

17001 Nov. 27.—BRITISH THOMSON-HOUSTON CO., LTD., and T. W. MUNRO—Evacuated electron discharge devices.

17003 Nov. 27.—WESTERN ELECTRIC CO.—High-frequency signalling. (Convention application, United States, Nov. 29, 1915. Patent No. 102500. *Open to inspection.*)

17130 Nov. 29.—G. CONSTANTINESCU and W. HADDON—Mechanical wave transmission of power.

17170 Nov. 30.—WESTERN ELECTRIC CO.—High-frequency signalling. (Convention application, United States, Dec. 1, 1915. Patent No. 102503. *Open to inspection.*)

17212 Nov. 30.—E. H. and K. A. WIDEGREN—System of controlling electric apparatus by wireless transmission. (Convention application, Sweden, Dec. 20, 1915. Patent No. 102942. *Open to inspection.*)

17476 Dec. 5.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and I. SHOENBERG—Method of multiplying the frequency of electric currents.

17507 Dec. 6.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Electrical discharge devices.

17529 Dec. 6.—BERGMANN ELEKTRICITÄTS-WERKE A.G.—Machine for conversion or simultaneous production of alternating currents of different frequency. (Convention application, Germany, Dec. 8, 1915. Patent No. 102618. *Open to inspection.*)

17588 Dec. 7.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Electrical discharge tubes.

17759 Dec. 9.—MARCONI'S WIRELESS TELEGRAPH CO., LTD., and W. S. ENTWISTLE—Wireless telegraph transmitters.

17916 Dec. 13.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Method of producing alternating electric currents.

17926 Dec. 13.—SOC. FRANÇAISE RADIO-ÉLECTRIQUE—High-frequency alternators. (Convention application, France, Sept. 16, 1915. Patent No. 102738. *Open to inspection.*)

17981 Dec. 14.—D. F. COMSTOCK—Method of controlling apparatus for producing ionic discharges.

17983 Dec. 14.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)—Method of producing a high vacuum.

18141 Dec. 18.—G. CONSTANTINESCU and W. HADDON—Feeding wave transmission lines.

18193 & Dec. 19.—BRITISH THOMSON-HOUSTON CO., LTD. (*General Electric Co., U.S.A.*)

18301 Dec. 21.—Protective devices for electric circuits.

18307 Dec. 21.—A. H. FRANCKS—Operating electric switches from a distance.

18381 Dec. 22.—FIAT SAN GIORGIO SOC. ANON.—Device for electrical controlling helms of ships. (Convention application, Italy, Dec. 22, 1915.)

18402 Dec. 22.—M. B. RODRIGUEZ—Transmission of electric currents of varying potential.

18672 Dec. 30.—J. F. G. P. HARTMANN—Apparatus for transforming, and especially for rectifying alternating and polyphase currents. (Convention application, United States, Dec. 30, 1915.)

PATENTS IN THE UNITED STATES

1166582 Jan. 4.—GEORGE DÉSILETS (Nicolet, Quebec)—Wireless apparatus for producing and transmitting musical sounds. (Convention application, Canada, May 29, 1914.)

1166892 Jan. 4.—REGINALD A. FESSENDEN (Brant Rock, Mass.)—Apparatus for producing high-frequency oscillations.

1166893 Jan. 4.—Method of producing high-frequency oscillations. (*Divided application*, original filed Mar. 22, 1915.)

1167163 Jan. 4.—CROSBY F. FRANK (Schenectady, N.Y.)—Coherer. (*Assigned to General Electric Co., New York.*)

1168541 Jan. 18.—ELMAN B. MYERS (New York)—Apparatus for wireless telephony.

1168837 Jan. 18.—EGBERT VON LEPEL (Berlin)—Method of producing electrical oscillations.

1169082 Jan. 18.—ROBERT VON LIEBEN, EUGEN REISZ, and SIEGMUND STRAUSS (Vienna)—Electron discharge tube. (*Assigned to the Relais-Ges. m.b.H. of Vienna.*)

1169422 Jan. 25.—ALEXANDER MCLEAN NICOLSON (Tarrytown, N.Y.)—Thermionic repeater. (Continuation of Patent No. 1130009.) (*Assigned to Western Electric Co., New York.*)

1170680 Feb. 8.—FREDERICK G. SARGENT (Westford, Mass.)—Selective wireless telegraph apparatus.

1170853 Feb. 8.—HARRY SHOEMAKER (Jersey City, N.J.)—Wireless signalling apparatus. (*Assigned to Marconi's Wireless Telegraph Co. of America, N.J.*)

1170882 Feb. 8.—LEE DE FOREST (New York)—Automatic switching device for telephone systems.

1170969 Feb. 8.—REGINALD A. FESSENDEN (Brant Rock, Mass.)—Secret and simultaneous transmission and reception of wireless messages at high speed and without interference.

1171598 Feb. 15.—LEE DE FOREST (New York)—Spark-gap for radiotone wireless telegraph systems. (*Assigned to the Radio-Telegraph and Telephone Co., Delaware.*)

1172017 Feb. 15.—REGINALD A. FESSENDEN (Brant Rock, Mass.)—Method of transmitting energy by electro-magnetic waves.

1172515 Feb. 22.—LEE B. and RAYMOND A. CLARK (Mutual, Oklahoma)—System of distant selection and control by means of electromagnetic waves. (*Assigned* to *Clark Brothers Wireless Selection and Control Co., Arizona.*)

1173079 Feb. 22.—ERNST F. W. ALEXANDERSON (Schenectady, N.Y.)—Selective tuning device. (*Assigned to General Electric Co., New York.*)

1173540 Feb. 29.—JAMES E. SEELEY (Los Angeles, California)—Portable electro-therapeutic apparatus for producing, receiving, and modifying electric oscillations. (*Assigned to the Vulcan Coil Co., California.*)

1173562 Feb. 29.—WILLIAM THEODORE DITCHAM (Twickenham, England)—Radio-telephone transmitting system. (Convention application, Great Britain, June 28, 1914.)

1173630 Feb. 29.—CLARENCE I. ZIMMERMAN (Madison, Wisconsin)—Method of and means for, the production and control of current impulses.

1173679 Feb. 29.—MENDEL OSNOS (Berlin, Germany)—System of producing high-frequency oscillations. (*Assigned to the General Electric Co., New York.*) (Convention application, Germany, Jan. 16, 1914.)

1173957 Feb. 29.—WALTER HAHNEMANN (Kiel, Germany)—Wireless telegraphy and telephony.

1174600 March 7.—WILLIAM J. MURDOCK (Everett, Mass.)—Condenser.

1174676 March 7.—EUGENE W. CALDWELL (New York)—Vacuum valve-tube.

1174793 March 7.—ERNST F. W. ALEXANDERSON (Schenactady, N.Y.)—Method of frequency transformation. (*Assigned to the General Electric Co., New York.*)

1175418 March 14.—REGINALD A. FESSENDEN (Brant Rock, Mass.)—Improvements in the production and reception of wireless impulses.

1176282 March 21.—Improvements in wireless telegraph apparatus.

1176320 March 21.—LUCIEN ROUZET (Levallois-Perret, France)—Transmitting apparatus for wireless telegraphy.

1176623 March 21.—LOUIS TRONCHON (Paris, France)—Spark-gap adjuster. (Convention application, France, March 28, 1913.) (*Assigned to Compagnie Générale Radio-télégraphique, Paris.*)

1176925 March 28.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Apparatus for radio-telegraphic communication. (*Assigned to Wireless Specialty Apparatus Co., Boston.*)

1177708 April 4.—PAUL JUHASZ (South Bend, Indiana)—Wireless safety ship-signal.

1178890 April 11.—GRAF GEORGE VON ARCO, AUGUST LEIB, and AUGUST FREY (Berlin)—Radio-telegraph station. (*Assigned to Ges. für Drahtlose Telegraphie, m.b.H., Berlin.*)

1179353 April 11.—LEONARD F. FULLER (Palo Alto, California)—Improvements in transmitting circuit of wireless telegraph apparatus. (*Assigned to Federal Telegraph Co., San Francisco.*)

1179906 April 18.—REGINALD A. FESSENDEN (Brant Rock, Mass.)—Improvements in methods of transmitting, receiving, and recording wireless telegraph signals.

1180075 April 18.—PAUL PICHON (Sudende, Germany)—Apparatus for the production and detection of electric oscillations. (Convention application, Germany, June 13, 1907.) (*Assigned to Ges. für Drahtlose Telegraphie, m.b.H., Berlin.*)

1181556 May 2.—GEORGE VON ARCO and ALEXANDER MEISSNER (Berlin, Germany).—Improvements in means for producing high-frequency currents. (*Assigned to Ges. für Drahtlose Telegraphie, m.b.H., Berlin.*)

1181711 May 2.—ERNEST & WILLIAM H. WILSON (Surrey, England)—Improvements in and connected with electrical oscillation systems. (Convention application, Great Britain, Nov. 23, 1910.) (*Assigned to the Indo-European Telegraph Co., London.*)

1181901 May 2.—CHARLES S. LENZ (New York)—Electro-magnetic wave detector.

1182003 May 9.—REGINALD A. FESSENDEN (Brant Rock, Mass.)—Signalling by electro-magnetic waves.

1182290 & 1182291 May 9.—GEORGE S. MEIKLE (Schenectady, N.Y.)—Device for the rectification of alternating current and a method of operating the same. (*Assigned to the General Electric Co., New York.*)

1182946 May 16.—ROSS J. VOSBURGH (Brooklyn, N.Y.)—Detector for wireless signals.

1183802 & 1183803 May 16.—LEE DE FOREST (New York)—Improvements in wireless telegraph range-finding apparatus. Wireless telephone system. (*Assigned to the Radio-telegraph and Telephone Co., Delaware.*)

1184376 May 23.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Receiver for radio-telegraphy and telephony. (*Assigned to Wireless Specialty Apparatus Co., Mass.*)

1184434 May 23.—CORNELIUS D. EHRET (Philadelphia, Penn.)—Method of and apparatus for wireless telephony and telegraphy.

1184783 May 30.—JAMES B. SPEED (West New Brighton, N.Y.)—Means for observing and signalling between ships in fog. (*Assigned to the Western Electric Co., New York.*)

1184843 May 30.—REGINALD A. FESSENDEN—Methods for securing freedom from disturbances in telegraphic transmission.

1185479 May 30.—FREDERICK J. CHAMBERS (London, England)—Transmitter for signalling by electro-magnetic waves. (Convention application, Great Britain, Feb. 8, 1912.) (*Assigned to the Automatic Telephone Manufacturing Co., Liverpool, England.*)

1185711 June 6.—GREENLEAF W. PICKARD—Receiver for wireless telegraphy and telephony. (*Assigned to Wireless Specialty Apparatus Co., New York.*)

1186246 June 6.—HARRY R. VAN DEVENTER (Sumter, S. Carolina)—Combined ignition and radio system. (*Assigned to Splitdorf Electrical Co., Newark, N.J.*)

1186455 June 6.—W. TORIKATA, E. YOKOYAMA, and M. KITAMURA (Tokyo, Japan)—High-frequency generators for use in radio-telegraphy, radio-telephony, and the like.

1186654 June 13.—ADOLF FRANKE (Berlin, Germany)—Means for producing phase-shifted oscillations in a plurality of independent oscillation-circuits. (Convention application, Germany, Oct. 1, 1913.)

1188324 June 20.—JACOB M. ROBERTS (Norfolk, Virginia)—Electric spark-gap apparatus.

1188531 June 27.—JOHN R. GARSON (New York)—Duplex wireless system employing different wave-lengths for the simultaneous transmission and reception of messages. (*Assigned to the American Telephone and Telegraph Co., New York.*)

1189070 June 27.—BURR V. DEITZ (Slingerlands, N.Y.)—System of radio-telegraphy for the transmission from one aerial system of two or more messages.

1189791 July 4.—EMORY L. CHAFFRE (Somerville, Mass.)—Apparatus for and method of exciting electric oscillations.

1189891 July 4.—FREDERICK G. SIMPSON (Seattle, Washington)—Improvements in apparatus for wireless telegraphy.

1190412 July 11.—WALTER G. HUDSON (New York)—Electrode for devices for varying electrical resistance. (*Assigned to the Radio-telephone and Telegraph Co., Delaware.*)

1190869 July 11.—LEE DE FOREST (New York)—Quench-spark discharger. (*Assigned to the Radio-telephone and Telegraph Co., Delaware.*)

1192126 July 25.—ARCHIBALD SHAW (Randwick, N.S.W., Australia)—Improvement in wireless telegraph transmitters. (Convention application, Australia, June 29, 1912.)

1192909 Aug. 1.—FRED. H. KROGER (Brooklyn, N.Y.)—Improvements in spark-gaps. (*Assigned to the Receivers for the National Electric Signalling Co., Pennsylvania.*)

1193206 Aug. 1.—HENDRICK J. VAN DER BIJL (New York)—Thermionic amplifier and rectifier. (*Assigned to the Western Electric Co., New York.*)

1193778 Aug. 8.—ALFRED H. GREBE (Richmond Hill, New York)—Receiving apparatus for radio-transmission systems.

1194066 Aug. 8.—JOHN A. PROCTOR (Revere, Mass.)—System of wireless communication. (*Assigned to Wireless Specialty Apparatus Co., Boston, Mass.*)

1194154 Aug. 8.—MELVILLE EASTHAM (Cambridge, Mass.)—Apparatus for producing electrical oscillations. (*Assigned to the General Radio Co., Mass.*)

1194274 Aug. 8.—FREDERICK J. CHAMBERS (London, England)—Transmitter for signalling by electro-magnetic waves. (*Assigned to the Automatic Telephone Manufacturing Co., Liverpool, England.*)

1194820 Aug. 15.—EDWIN H. COLPITTS (East Orange, N.J.)—Multiplex radio-telegraph system. (*Assigned to the Western Electric Co., New York.*)

1195485 Aug. 22.—CHARLES V. LOGWOOD and CYRIL F. ELWELL (Palo Alto, Cal.)—Improvements in transmitting systems for space telegraphy wherein signals are transmitted through the natural media by means of continuous undamped waves of high frequency.

1195632 Aug. 22.—WILLIAM C. WHITE (Schenectady, New York)—Circuit connections of electron-discharge apparatus. (*Assigned to the General Electric Co., New York.*)

1196474 Aug. 29.—ALEXANDER MCLEAN NICOLSON (Tarrytown, New York)—Improvements in vacuum tube vessels and thermionic devices of the audion type. (*Assigned to the Western Electric Co., New York.*)

1196938 Sept. 5.—REGINALD A. FESSENDEN and LOUIS COHEN (Brooklyn, Mass.)—Method of, and apparatus for, amplifying electric impulses.

1196949 Sept. 5.—WALTON HARRISON (New York)—Transmission of articulate speech and other sounds by means of Hertzian waves.

1196969 Sept. 5.—JOSEPH MURGAS (Wilkes-Barre, Penn.)—Method of, and apparatus for, producing electric oscillations from alternating currents.

1197366 Sept. 5.—WALTER HAHNEMANN (Keil, Germany)—Wireless signalling apparatus. (Continuation of No. 1173957.)

1197473 Sept. 5.—PERCY W. FULLER (Boston, Mass.)—Wireless signalling apparatus for determining the distance and direction of an object from any given point.

1198270 Sept. 12.—VALDEMAR POULSEN (Frederiksberg, Denmark)—Apparatus for utilising signal currents for radio-telegraphic and other purposes. (Convention application, Denmark, March 5, 1915.)

1198699
1198700 Sept. 19.—EDWIN H. COLPITTS (East Orange, N.J.)—Control device for wireless signalling. (*Assigned to the Western Electric Co., New York.*)

1198776 Sept. 19.—JOSEF SCHIESSLER (Vienna, Austria-Hungary)—Apparatus for producing oscillating current. (Convention application, Austria, April 20, 1908.)

1199180 Sept. 26.—RAYMOND A. HEISING (East Orange, N.J.)—Improvements in the art of transmitting signals by means of high-frequency electric waves. (*Assigned to Western Electric Co., New York.*)

1199213 Sept. 26.—FREDERICK G. SIMPSON (Seattle, Washington)—Transmitting apparatus for wireless telegraph stations.

1200210 Oct. 3.—FREDERICK H. MILLENER (Omaha, Nebraska)—Transmitter for etheric or wireless telephone systems.

1200412 Oct. 3.—MANRICO COMPARE (Leghorn, Italy)—Improvements in and relating to wireless control systems. (Convention application, Great Britain, Nov. 20, 1914.)

1201034 Oct. 10.—EDWIN R. GILL (Yonkers, N.Y.)—Improvements in the art of utilising Hertizan waves.

1201270 Oct. 17.—LEE DE FOREST (New York)—Oscillating current
1201271 generator. Oscillating audion. Telegraph and tele-
1201272 & phone receiving system. Oscillation generator. (Divi-
1201273 sion of original application. Serial No. 27,771, May 13, 1915.) (*All assigned to the Radio-telephone and Telegraph Co., New York.*)

1202168 Oct. 24.—EDWIN B. DALLIN (Arlington, Mass.)—Receiving system for electro-magnetic waves.

1202925 Oct. 31.—FRANK D. URIE (Elgin, Ill.)—Automatic recording system for radio time signals.

1203064 Oct. 31.—FREDERICK G. SIMPSON (Seattle, Washington)—Transmitting apparatus for wireless telegraph and telephone systems.

1203190 Oct. 31.—CHARLES E. FRITTS (New York)—Method of recording and reproducing pulsations or variations in sounds and other phenomena.

1204720 Nov. 14.—EGBERT VON LEPEL (Wilmersdorf, Germany)—Circuit arrangement for wireless transmitters. (Convention application, Germany, Feb. 11, 1913.)

1204748 Nov. 14.—BURR V. DEITZ (Slingerlands, N.Y.)—Improvement in wave-meters.

1205365 Nov. 21.—JOHN P. MCCARTHY and KENDALL DOUGLASS (San Francisco, Cal.)—Improvements in methods of and apparatus for wireless telephony. (*Assigned to the Universal Wireless Telegraph and Telephone Co., Los Angeles, Cal.*)

1205469 Nov. 21.—FREDERICK M. MILLENER (Omaha, Nebraska)—Apparatus for the accurate and economical transmission of speech and signals through space without the aid of wires or like conductors.

1205530 Nov. 21.—RAY E. HALL (Portland, Oregon)—Method of, and apparatus for, translating sounds, particularly those produced in wireless receivers, into mechanical movements.

1206352 & Nov. 28.—FREDERICK H. MILLENER (Omaha, Nebraska)—
1206353 Apparatus for the wireless transmission of energy. Antenna and support for use in wireless telegraph and telephone systems.

1206643 Nov. 28.—ERNST F. ALEXANDERSON (Schenectady, N.Y.)—Method of, and apparatus for, controlling alternating currents. (*Assigned to the General Electric Co., New York.*)

1206911 Dec. 5.—GREENLEAF W. PICKARD (Amesbury, Mass.)—Improvements in the system of radio-communication. (*Assigned to Wireless Specialty Apparatus Co., Boston, Mass.*)

1207347 Dec. 5.—JOSEPH VON KOWALSKI-WEIRUSZ (Fribourg, Switzerland)—Method of obtaining ultra-violet rays by spark discharge. (Convention application, Switzerland, April 10, 1914.)

1208187 Dec. 12.—FREDERICK N. MILLENER (Omaha, Nebraska)—Apparatus for generating high-frequency electrical oscillations. (Division of Patent No. 1205469, Nov. 21, 1916.)

1208597 Dec. 12.—GEORGE M. J. MACKAY (Schenectady, N.Y.)—Improvements in enclosed arc devices and methods of operating the same. (*Assigned to the General Electric Co., New York.*)

1209324 Dec. 19.—ALEXANDER MCLEAN NICOLSON and EMERSON C. HULL (New York)—Improvements in electron-emitting cathodes and in the process of manufacturing the same. (*Assigned to the Western Electric Co., New York.*)

1209636 Dec. 19.—CHRISTIAN BERGER (New York)—Improved sound-operated circuit controller. (*Assigned to the Submarine Wireless, Co., New York.*)

Photo by Harris & Ewing.

DR. LOUIS W. AUSTIN, HEAD OF THE UNITED STATES RADIO LABORATORY, WASHINGTON.

(*For whose Biographical Notice see page 872.*)

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DEFINITIONS OF TERMS USED IN WIRELESS

(Compiled from the Report of the Committee of Standardization of the Institute of Radio Engineers and from other sources, Dr. J. ERSKINE MURRAY, D.Sc., F.R.S.E., M.I.E.E.)

DEFINITION OF TERMS.

NOTE.—Terms are generally arranged alphabetically according to the *noun* referred to.

1. AERIAL.—The system of conductors designed to radiate, or absorb electro-magnetic waves.

2. AERIAL CIRCUIT.—The circuit comprising the aerial conductors, the earth conductors, and all inductances and condensers connected between them, and the capacity aerial—earth within the limits outside of which radiation takes place.

3. AERIAL RESISTANCE.—(See Antenna Resistance).

4. ÆTHER.—See Ether.

5. ALTERNATING CURRENT.—One which reverses its direction periodically with time.

6. ALTERNATOR.—A rotating machine which transforms mechanical energy into electrical energy, producing at its terminals one or more alternating E.M.F.'s (single phase or polyphase).

7. AMMETER (HOT BAND : HOT WIRE).—An ammeter dependent for its indications upon the change in dimensions of an element which is heated by a current through it.

8. AMMETER, THERMO.—An instrument for measuring current, depending for its indications on the voltage generated at the terminals of a thermo junction heated either directly or indirectly by the current to be measured.

9. AMPLIFIER OR AMPLIFYING RELAY.—An instrument which modifies the effect of a local source of energy in accordance with the variations of received energy ; and, in general, produces a larger indication than could be had from the incoming energy alone.

10. AMPLIFICATION, COEFFICIENT OF.—The ratio of the useful effect obtained by the employment of the amplifier to the useful effect obtained without that instrument.

11. AMPLITUDE.—The maximum value of current or voltage attained during any half period of an alternating current or voltage is called the amplitude during that half period.

12. ANGULAR VELOCITY.—Of a periodic alternating current in radians per second equals 2π times the frequency in cycles per second.

13. ANODE.—(*a*) In an electrolytic cell. The conductor through the surface of which the current enters the liquid.

(*b*) In a primary cell. The metal (usually zinc) through which the current enters the electrolyte, also termed negative terminal.

(*c*) The terminal by which the current enters a cell or other apparatus, such as a vacuum tube, etc. (B.E.C.).

14. ANTENNA.—See Aerial.

15. ANTENNA, DIRECTIVE.—An antenna having the property of radiating a maximum of energy in one (or more) directions.

16. ANTENNA, FLAT TOP.—An antenna having horizontal wires at the top covering a large area.

17. Antenna, Harp.—An antenna having an approximately vertical section of large area and considerable width.

18. Antenna, Inverted L.—A flat top antenna in which the leading down wires are taken from one end of the long narrow horizontal section.

19. Antenna, Loop.—An antenna in which the wires form a closed circuit, part of which may be the ground.

20. Antenna, Plain.—An approximately vertical single wire.

21. Antenna, T.—A flat top antenna in which the horizontal section is long and narrow, the leading down wires being taken from the centre.

22. Antenna, Umbrella.—One whose conductors form the elements of a cone from the elevated apex of which the leading down wires are brought.

23. Antenna Resistance.—An effective resistance which is numerically equal to the ratio of the power in the entire antenna circuit to the square of the R.M.S. current at a potential node (generally the ground).

Note.—Antenna Resistance includes :
- Radiation resistance.
- Ground resistance.
- Radio frequency ohmic resistance of antenna and loading coil and shortening condensers.
- Equivalent resistance due to corona, eddy currents, and insulator leakage.

24. Aperiodic Circuit.—A circuit which has no definite time period, this being due either to its resistance being large enough to prevent natural oscillations occurring, or to its having no capacity or no inductance by which it can be tuned.

25. Arc.—" A luminous discharge of electricity through a gas in which the material of one or both the electrodes is volatilised and takes part in the conduction of the current, whether continuous or alternating" (B.E.C.). Arc.—The passage of an electric current of relatively high density through a gas or vapour the conductivity of which is mainly due to the electron emission from the self-heated cathode. Under present practical conditions the phenomena take place near atmospheric pressure (I.R.E.).

26. Arc Oscillator.—An arc used with an oscillating circuit for the conversion of direct to alternating or pulsating current. The oscillations generated are classified as follows :

Class (1).—Those in which the amplitude of the oscillation circuit current produced is less than the direct current through the arc.

Class (2).—Those in which the amplitude of the oscillation circuit current is at least equal to the direct current, but in which the direction of the current through the arc is never reversed.

Class (3).—Those in which the amplitude of the initial portion of the oscillation circuit current is greater than the direct current passing through the arc, and in which the direction of the current through the arc is periodically reversed.

27. Arrester, Earth.—A spark gap with a small gap and large sparking surfaces ; used to protect receiving apparatus from powerful discharges.

28. ASYNCHRONOUS.—" A term applied to an A.C. generator or motor, the speed of which has no fixed relation to the frequency of the current " (I.E.C.).

29. ATMOSPHERIC ABSORPTION.—That portion of the total loss of radiated energy due to atmospheric conductivity, reflection, and refraction.

30. ATMOSPHERICS.—Disturbances produced in the receiving circuits, caused by electrical action in the atmosphere or in the earth's surface. They are also known as " X's," " Strays," and in the U.S.A. as " Static."

31. ATTENUATION (RADIO).—This is the decrease, with distance from the radiating source, of the amplitude of the electric and magnetic forces accompanying (and constituting) an electro-magnetic wave.

32. ATTENUATION, COEFFICENT OF (RADIO).—The coefficient, which, when multiplied by the distance of transmission through a uniform medium, gives the natural logarithm of the ratio of the amplitude of the electric or magnetic force at that distance to the initial value of the corresponding quantity.

33. AUDIBILITY.—The ratio of the telephone current variation producing the received signal to that producing a just audible signal, *i.e.*, one which permits the mere differentiation of dots and dashes.

The measurement of audibility is an arbitrary method for determining the relative loudness of telephone response in radio receivers, in which it is stated that a signal has an audibility of given value. The determination of the above ratio may be made by the non-inductive shunt-to-telephone method, except that a series resistance should be inserted to keep the main current constant, and that the shunt resistance should therefore be connected as a potentiometer.

34. AUTO-JIGGER.—See Jigger.

35. AUTOMATIC RECEIVER.—A receiver which records signals so they can be translated at any convenient time after reception.

36. AUTOMATIC TRANSMITTER.—A transmitter which has the usual operating key replaced by any mechanical telegraph sender, such as a Wheatstone transmitter.

37. BALANCING AERIAL.—An aerial used in duplex wireless telegraphy. It fills a purpose similar to that of the artificial line in duplex wire telegraphy.

38. BATTERY.—A primary or secondary cell for producing electric current or a collection of such units. A collection of condenser units.

39. BEAT.—When two oscillations of slightly different frequencies are impressed on an electrical circuit they periodically help and oppose each other. The result is an oscillation whose successive half periods gradually increase and decrease in amplitude with a frequency equal to the difference between the two impressed frequencies.

40. BRUSH DISCHARGE.—" A discharge having a feathery form, and consisting of an intermittent partial discharge which takes place from a conductor when the potential difference exceeds a certain limit, but is not high enough to cause the formation of a true spark or arc. It is always accompanied by a hissing or cracking sound " (I.E.C.). When such a discharge is being given off by a conductor the latter is said to be " Brushing."

41. BRUSH OR CORONAL LOSSES.—Those due to leakage convection electric currents through a gaseous medium.

42. Buzzer.—A small mechanism (usually electromagnetic) used for rapidly making and breaking an electric circuit. When connected in series with part of a circuit in which oscillations are possible it continually impulses the circuit, thereby producing oscillations which are convenient for testing purposes.

43. Cage Conductor.—A group of parallel wires arranged as the elements of a long cylinder.

Note.—Any conducting element of an antenna may be a cage conductor.

44. Capacity.—That property of a material system by virtue of which it is capable of storing energy electrostatically.

The capacity of a system is dependent on its geometrical dimensions, its position relative to other conductors, and the dielectric constants of the surrounding media.

Capacity is measured by the ratio of the quantity of electricity stored to the potential difference at which it is stored.

A distinctive property of a capacity is that it permits the passage of electrical energy through it only in the form of displacement currents.

45. Capacity, Effective, of an Antenna.—The effective capacity and effective inductance of an antenna at any oscillation frequency are the equivalent capacity and inductance values determined from the following fundamental equations :

$$\omega=\sqrt{\frac{1}{LC}} \quad . \quad . \quad . \quad . \qquad (1)$$

where L = the total antenna inductance,

C = the total antenna capacity,

ω = the angular velocity of the free alternating currents in the antenna.

$$d=\pi R\sqrt{\frac{C}{L}} \quad . \quad . \quad . \quad . \quad . \qquad (2)$$

or

$$d'=\pi R'\sqrt{\frac{C}{L}} \quad . \quad . \quad . \quad . \quad . \qquad (2a)$$

where R = series resistance inserted at the base of the antenna and

d' = increased decrement resulting therefrom.

Solving (1) and (2a) for L and C, we have

$$L=\frac{\pi R'}{\omega d'}=\frac{R'}{6\times 10^8\times d'}\cdot\lambda \qquad (\lambda \text{ in meters}).$$

$$C=\frac{d'}{R'}=\frac{d'}{6\pi^2\times 10^8\times R'}\cdot\lambda \qquad (\lambda \text{ in meters}).$$

Having the antenna inductance and capacity, the resistance R of the antenna can be determined from equation (2). This value of R satisfies the fundamental equation :

RI^2 = power absorbed by the antenna,

where I = current measured at the base of the antenna.

Note.—The equation

$$I=\omega CE$$

$$\left(\text{and also } E=\frac{\pi R'}{d'}\cdot I\right)$$

defines an effective voltage E, which is the voltage approximately given by the equation. Energy per spark $=\frac{1}{2}CE^2$.

46. Cathode.—See Kathode.

47. Centre of Capacity of an Antenna.—See Form Factor, Note 2.

48. Changer, Frequency.—A device delivering alternating currents at a frequency which is some multiple of frequency of the supply current.

49. Changer, Wave.—A transmitting device for rapidly and positively changing the wave length.

50. Characteristic Curve.—A curve showing the variation of a property of a material or a piece of apparatus when submitted to a changing influence which produces that variation.

The characteristic curve of an arc or crystal shows the relation between the current produced and potential required to produce the current.

51. Characteristic, Dynamic, of a Conductor (for a given frequency and between given extremes of impressed E.M.F. and resultant current through the conductor).—This is the relation given by the curve obtained when the impressed E.M.F.'s are plotted as ordinates against the resultant currents as abscissas, both E.M.F.'s and currents varying at the given frequency and between the given extremes.

52. Characteristic, Static, of a Conductor.—This is the relation given by the curve plotted between the impressed electromotive force as ordinates and the resultant current through the conductor as abscissas, for substantially stationary conditions.

53. Choking Coil.—"A coil with so great a self-induction that its impedance depends chiefly on the self-induction rather than upon the resistance" (I.E.C.). Generally called a Reactance Coil in U.S.A.

54. Circuit, Closed Oscillating.—A circuit in which the capacity and inductance in series, are localised substantially in different places, and which has very small power of radiating electromagnetic waves.

55. Coefficient, Attenuation, Radio.—See Attenuation.

56. Coefficient of Amplification.—See Amplification.

57. Coefficient of Coupling, Inductive.—The ratio of the effective mutual inductance of two circuits to the square root of the product of the effective self-inductances of each of these circuits.

58. Code.—A system of conventional characters designed to represent letters by dots and dashes. The International Morse Code is official.

59. Coherer.—A form of detector (q.v.). An imperfect contact or collection of such contacts so arranged that when under the influence of an alternating potential it coheres and allows current from a local battery to pass and make some kind of signal. A device sensitive to radio frequency energy, and characterised by (1) a normally high resistance to currents at low voltages, (2) a reduction in resistance on the application of an increasing electromotive force, this reduction persisting until eliminated by the application of a restoring or disturbing mechanical force, and (3) the substantial absence of thermoelectric or rectifying action.

60. Communication, Radio.—The transmission of signals by means of electromagnetic waves originating in a constructed circuit.

61. Compass, Radio.—A radio receiving device for determining the direction (or the direction and its opposite) in which maximum energy is received; or

A radio transmitting device for determining the direction (or the direction and its opposite) of maximum radiation.

62. CONDENSER.—A material system possessing electrostatic capacity. Two conducting surfaces separated by a dielectric.

63. CONDENSER, AIR.—A condenser having air as its dielectric.

64. CONDENSER, COMPRESSED GAS.—A condenser having compressed gas as its dielectric.

65. CONDUCTOR, CAGE.—See Cage Conductor.

66. CONDUCTION CURRENT.—A transfer of electrical energy guided by a conducting medium.

67. CONTINUOUS CURRENT.—A term recommended by the I.E.C. to supersede "direct current" as a description of "an electric current in one direction and sensibly steady or free from pulsation. Abbreviated CC."

68. CONTINUOUS WAVES.—The term applied to waves radiated from an aerial in which oscillations are sustained. Continuous waves may have successive half periods of equal amplitude, or the amplitude may vary within small limits without detriment to their use for wireless telegraphy.

69. CONVECTION CURRENT.—A transfer of electrical energy by separate charged particles, unguided by any material medium.

70. CONVERTER, ROTARY.—A machine for converting electrical energy of one form of current to electrical energy of another form, such as from alternating current to continuous or *vice versa*.

71. CORONA.—See Brush or Coronal Losses.

72. COUNTERPOISE.—A system of electrical conductors forming one portion of a radiating oscillator the other portion of which is the antenna. In land stations, a counterpoise forms a capacitive connection to ground.

73. COUPLER.—An apparatus which is used to transfer radio frequency energy from one circuit to another by associating portions of these circuits.

74. COUPLER, CAPACITIVE.—An apparatus which, by electric fields joins portions of two radio frequency circuits, and which is used to transfer electrical energy between these circuits through the action of electric forces.

75. COUPLER, DIRECT.—A coupler which magnetically joins two circuits having a common conductive portion.

76. COUPLER, INDUCTIVE.—An apparatus which by magnetic forces joins portions of two radio frequency circuits.

77. COUPLING.—The connection between two circuits enabling energy to be transferred from one to the other. The connection may be by magnetic linkage, electrostatic linkage, direct connection, or any combination of these.

78. COUPLING, COEFFICIENT OF, in inductively coupled system is the ratio of the mutual inductance of the two circuits to the square root of the product of the self-inductance of the circuits. The coefficient

of coupling (κ) between two circuits tuned to the same frequency and then coupled, is also given by the formula :—

$$\kappa = \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2 + \lambda_2^2}$$

where $\lambda_1 \lambda_2$ are the longer and shorter resulting natural wave-lengths of the coupled system.

79. CRITICAL RESISTANCE.—That resistance which is just sufficient to prevent free oscillation in an electrical circuit. If L inductance, C Capacity, then Critical Resistance $= \sqrt{\frac{4L}{C}}$.

80. CRYSTAL DETECTOR.—A detector which uses the rectifying properties of the contact between a crystal and a metal surface or between two crystals.

81. CURRENT, DAMPED ALTERNATING.—An alternating current whose amplitude progressively diminishes. (Also called oscillating current.)

82. CURRENT, FORCED ALTERNATING.—A current, the frequency and damping of which are equal to the frequency and damping of the exciting electromotive force. See further, Current, Free Alternating.

NOTE 1.—During the initial stages of excitation, both free and forced currents co-exist.

83. CURRENT, FREE ALTERNATING.—The current following any transient electromagnetic disturbance in a circuit having capacity, inductance, and *less* than the critical resistance. See further, Resistance, Critical.

84. CURVE, DISTRIBUTION, OF A RADIO TRANSMITTING STATION FOR A GIVEN DISTANCE.—This is a polar curve the radii vectors of which are proportional to the field intensity of the radiation at that distance in corresponding directions. See also Compass, Radio.

NOTE 1.—The distribution curve depends, in general, not only on the form of the antenna, but also on the nature of the ground surrounding the station.

NOTE 2.—The distribution curve generally varies with the distance from the station.

85. CURVE, RESONANCE, STANDARD.—A curve the ordinates of which are the ratios of the square of the current at any frequency to the square of the resonant current, and the abscissas are the ratios of the corresponding wave length to the resonant wave length ; the abscissas and ordinates having the same scale.

86. CYCLOGRAM.—See Characteristic, Dynamic.

87. CYCLOGRAPH.—An instrument for the production of cyclograms.

88. CYMOMETER.—A " wave-measurer." See Wave-meter.

89. DAMPING.—The diminution of energy in an electrical circuit resulting from loss of energy.

90. DAMPING FACTOR (of a simple circuit).—The ratio of the effective resistance of that circuit to twice the effective inductance (the reciprocal of a time). This term applies only to circuits capable of carrying free alternating currents.

91. Decrement.—See Decrement, Linear, and Logarithmic.

92. Decrement, Linear, of a Linearly Damped Alternating Current.—This is the difference of successive current amplitudes in the same direction divided by the larger of these amplitudes.

Note.—Let I_n and I_{n+1} be successive current amplitudes in the same direction of a linearly damped alternating current.

Then, the linear decrement, which is not a constant but varies with the amplitude,

$$b = \frac{I_n - I_{n+1}}{I_n}$$

Also: $I_t = I_o\ (1 - bft)$,
where I_o = initial current amplitude,
I_t = current amplitude at time t,
f = frequency of alternating current.
$b = (I_0 - I_1)\ I_0$.

93. Decrement, Logarithmic, of an exponentially damped alternating current.—This is the logarithm of the ratio of successive current amplitudes in the same direction.

Note.—Logarithmic decrements are standard for a complete period or cycle.

Let I_n and I_{n+1} be successive current amplitudes in the same direction.
d = logarithmic decrement,

Then, $d = \log_\epsilon, \frac{I_n}{I_{n+1}}$, where $\epsilon = 2{\cdot}718+$.

94. Decremeter.—An instrument for measuring the logarithmic decrement of a circuit or of a train of electromagnetic waves.

95. Detector.—That portion of the receiving apparatus which, connected to a circuit carrying currents of radio frequency, and in conjunction with a self-contained or separate indicator, translates the radio frequency energy into a form suitable for operation of the indicator. This translation may be effected either by the conversion of the radio frequency energy, or by means of the control of local energy by the energy received.

96. Device, Acoustic Resonance.—A device which utilizes in its operation resonance to the audio frequency of the received signals.

97. Dielectric.—Any medium which will only allow of electric conduction to a small or negligible extent.

98. Dielectric Constant (or Specific Inductive Capacity) of a medium. The ratio of the capacity of a condenser having that medium as a dielectric to the capacity of a condenser having a vacuum dielectric, but otherwise identical. (The dielectric constant of air is substantially unity, and therefore for all practical purposes air may be used in place of the vacuum in the comparison condenser.)

99. Dielectric Hysteresis.—That lagging property of a dielectric which is measured by the energy lost when the rising and falling (displacement current)—(Voltage) characteristics (dynamic) are not identical.

100. Dielectric Hysteretic Constant of a given dielectric. The value of the dielectric hysteresis per cycle per unit of potential gradient applied to the dielectric.

101. Diffraction is the deviation of the direction of propagation of a wave from the normal to the wave front at the point where the waves pass the edge of an obstruction. The amount of diffraction depends on the wave-length and increases with increase of wave-length.

102. Diplex Telegraphy is the simultaneous transmission or the simultaneous reception of two messages at the same station.

103. Direct Coupling.—When one circuit is linked to another in such a way that a portion of the one forms part of the other they are said to be direct-coupled. An example is provided in the auto-jigger (*vide* Jigger), in which a portion of the inductance is common to two circuits.

104. Direction Finder, Wireless.—A receiving instrument which, in combination with a special aerial system, enables the direction of the transmitting station to be determined.

105. Disc Discharger, Asynchronous.—A disc discharger the speed of which has no fixed relation to the frequency of the current charging the condenser which it discharges.

106. Disc Discharger, Synchronous.—A disc discharger usually directly coupled to the alternator supplying power to the condenser. It may discharge the condenser, one, two, three, or more times during a half-period ; or every one, two, or more half-periods. The usual practice is to discharge once every half-period, at the moment when the condenser potential is a maximum, and the alternator current zero.

107. Discharger.—That piece of apparatus in the primary oscillating circuit at which the spark takes place.

108. Duplex Telegraphy.—Is the transmission of a message and the reception of a message simultaneously at the same station.

109. Displacement Current.—The electrical condition within a dielectric region of varying electric stress. It produces the same external electric and magnetic effects as the equivalent conduction current.

110. Earth Connection, or "Earth."—The connection to the earth which in most systems forms the lower extremity of the Aerial System (q.v.). It usually takes the form of a system of metal plates or wires, or a combination of both, more or less deeply buried in the ground. (U.S. equivalent, Ground.)

111. Eddy Currents.—Those induced in conducting masses by external varying magnetic fields, the location of these currents being primarily determined by the position of the fields and not by the configuration of the conducting mass. (That is, the conducting mass is not specially arranged to provide perfectly well-defined circuits.) Such parasitic currents are also called Foucault currents.

112. Electric Potential is defined as the work done in carrying a unit charge of electricity from infinity to the point considered. (See Electromotive Force.)

113. Electric Stress.—The cause of the electrically strained condition in the medium between two regions which are at different potentials.

114. Electromagnetic Wave.—A progressive disturbance characterised by the existence on the wave front of electric and magnetic forces acting in directions which are perpendicular to each other and to the direction of propagation of the wave.

115. Electromotive Force.—The force which tends to displace electricity, and is equal to the difference of potential between the points considered.

116. Ether.—The medium assumed by electromagnetic theory in order to explain the translation of energy at finite speed by electromagnetic waves.

117. Excitation, Impulse.—A method of producing free alternating currents in an excited circuit in which the duration of the exciting current is short compared with the duration of the excited current.

Note.—The condition of short duration implies that there can be no appreciable reaction between the circuits.

118. Factor, Damping.—The product of the logarithmic decrement and the frequency of an exponentially damped alternating current.

Let I_o = initial amplitude,
I_t = amplitude at the time t,
ε = base of Napierian logarithms (2.718+),
α = damping factor.

Then, $I_t = I_0 \varepsilon^{-at}$.

119. Factor, Form.—The form factor of a symmetrical antenna for a given wave length is the ratio of the algebraic average value of the R.M.S. currents measured at all heights to the greatest of these R.M.S. currents.

Note 1.—For a given R.M.S. current at the base of the antenna, the field intensity at distant points is proportional to the form factor times the height of the antenna.

Note 2.—The effective height (height of centre of capacity) is equal to the form factor times the actual height of the antenna.

Note 3.—The limiting values of the form factor for various types of antennas are as follows:

	Linear or Vertical Antenna	Flat Top Umbrella Antenna
Long Waves	Lower Limit, 1/2	Upper Limit, 1
Fundamental	Lower Limit, $2/\pi$	————

Note 4.—The form factor varies in a given antenna at various wave lengths due to variation of the current distribution.

120. Forced Alternating Current.—One produced in *any* circuit by the application of an alternating electromotive force.

121. Free Alternating Current.—That produced by an isolated electrical displacement in a circuit having capacity, inductance, and less than the critical resistance.

122. Frequency.—A term used in connection with any form of rhythmical motion or rhythmical change, denoting the number of complete movements or changes in a given time—usually a second.

123. Frequencies, Audio (abbreviated A.F.).—The frequencies corresponding to the normally audible vibrations. These are assumed to lie below 10,000 cycles per second.

124. Frequencies, Radio (abbreviated R.F.)—The frequencies higher than those corresponding to the normally audible vibrations, which are generally taken as 10,000 cycles per second. See also Frequencies, Audio.

Note.—It is not implied that radiation cannot be secured at lower frequencies, and the distinction from audio frequencies is merely one of definition based on convenience.

125. Frequency Changer.—See Changer, Frequency.

126. Frequency, Group.—The number per second of periodic changes of amplitude or frequency of an alternating current.

Note 1.—Where there is more than one periodically recurrent change of amplitude, or frequency, there is more than one group frequency present.

Note 2.—The term "group frequency" replaces the term "spark frequency."

127. Frequency Meter.—An instrument which indicates frequency.

128. Frequency Transformer.—See Changer, Frequency.

129. Fundamental Frequency.—The lowest frequency to which an electrical circuit will resonate.

130. Fundamental of an Antenna.—This is the lowest frequency of free oscillations of the unloaded antenna. (No series inductance or capacity.)

131. Fundamental Wave Length.—The wave length corresponding to the lowest free period of any oscillator.

132. Gap, Micrometer.—A device for protecting any apparatus from excessive potentials, and consisting of a short gap designed for fine adjustment.

133. Ground.—A conductive connection to the earth.

134. Group Frequency.—The number of distinguishable alternating current groups occurring per second in an electrical circuit.

Note 1.—The group referred to above is, in general, mainly a free alternating current which is substantially damped to extinction before the beginning of the following group or train.

Note 2.—The pitch of the note in the receiving station is, in general, determined by the group frequency at the transmitting station.

Note 3.—The term "Group Frequency" replaces the term "Spark Frequency."

135. Harmonic Frequency.—The harmonics of any particular frequency are generally understood to be all higher frequencies which are odd or even multiples of the said frequency. An electrical oscillator which has uniformly distributed inductance and capacity (a straight wire nearly fulfils these conditions) will resonate to any odd or even multiple of its fundamental frequency according to whether one end is earthed or not. If the inductance and capacity are not uniformly distributed the circuit may resonate to a number of frequencies higher than its fundamental, but these higher frequencies will not necessarily bear any whole multiple relation to the fundamental frequency.

136. Height, Effective, of an Antenna.—See Factor, Form; Note 2.

137. Heterodyne.—A receiver for continuous waves using the principle of reaction between locally generated oscillations and the received oscillations in order to produce beats.

138. High-Frequency Resistance.—The resistance offered by a conductor to the passage of high-frequency currents.

It is always greater than the resistance for direct current because of the unequal current distribution over a section of the conductor when carrying high-frequency currents.

139. Impedance.—Total opposition to current flow in a circuit in which the current is varying, and is numerically equal to the square root of the sum of the squares of the ohmic resistance and the total reactance of the circuit.

140. Inductance.—That property of a material system by virtue of which it is capable of storing energy electromagnetically.

The inductance of a system is dependent upon its geometrical dimensions and the permeability of the surrounding media. In hysteresis-free circuits inductance is measured by the ratio of the energy stored in the magnetic field surrounding a current-carrying conductor to the square of the current in that conductor, for stationary conditions. In any circuit, it may be measured by the interlinkage with the system itself of magnetic lines of force due to unit current passing through the system. An alternative method involves the measurement of the counter-electromotive force at the terminals of the given conductor when the current through the conductor changes at the rate of one unit of current per second. In hysteresis-free circuits these three methods of measurement yield identical results.

141. Inductance, Effective, of an Antenna.—See Capacity, Effective, of an Antenna.

142. Induction Coil.—A piece of apparatus which makes use of the phenomena of induction to transform an intermittent current of comparatively low voltage to an intermittent current of high voltage.

143. Inductive Coupling.—Two circuits so arranged that some of the lines of force from one passing through the other circuit are inductively coupled.

144. Impulse Excitation.—See Excitation, Impulse.

145. Interference.—The interaction of two alternating currents or of electro-magnetic waves under conditions such that they oppose each other.

146. Interference (in reception).—The introduction of undesired signals, either from other stations of from Atmospherics (q.v.), into a receiver which is engaged in the reception of a message; often referred to as "jamming."

147. Interference, Wave (in Radio Communication).—The reinforcement or neutralisation of waves arriving at a receiving point along different paths from a given sending station; (to be distinguished from ordinary or station interference, which is the simultaneous reception of signals from two or more stations).

148. Ionisation of a Gas.—The breaking away from the molecules of the ions contained in them, thus rendering the gas conductive.

149. Jamming.—See Interference (in Reception).

150. Jigger.—The transformer used in coupled circuits. The primary and secondary form part of the primary and secondary circuits respectively. If the transformer has part of the winding common to both primary and secondary, it is called an Auto-Jigger.

151. Kathode.—" (*a*) In an electrolytic cell. The conductor through the surface of which the current leaves the electrolyte.

" (*b*) In a primary cell. The conductor (generally carbon) through which the current leaves the electrolyte.

" (*c*) The electrode by which the current leaves a cell or other apparatus, such as a vacuum tube " (B.E.C.).

152. Key (Manipulating) (Operating).—A switch arranged for easy manual operation.

153. Key, Relay.—See Relay Key.

154. Length, Wave.—See Wave Length.

155. Line of Force.—A curve described in an electric or magnetic field such that the direction of the electric or magnetic force at any point of that curve is a tangent to the curve.

156. Losses, Brush or Corona.—See Brush or Corona Losses.

157. Magnetic Field Intensity.—The number of lines of force per unit area.

158. Magnetic Force.—At a point. The force acting on a unit magnetic pole placed at that point. It is numerically equal to the field intensity in a medium of unit permeability.

159. Magnetic Hysteresis.—That property of a magnetic medium which is measured by the energy losses when the rising and falling (magneto-motive force—induction), *i.e.* (H—B), dynamic characteristics are not identical.

160. Magnetomotive Force.—A force tending to produce a magnetic flux.

161. Magnetic Detector (Marconi's).—A detector of oscillations depending on the effect on the hysteresis of iron.

162. Microphone.—A variable resistance, usually in the form of an electrical contact, whose resistance is varied with and in a proportional manner to the movement or pressure of one part. Thus if the movement or pressure is produced by sound waves acting on a diaphragm which is connected to the moving member of the microphone, an electrical current will be produced in the circuit containing the microphone and a battery, whose amplitude varies in a similar manner to the movement of the diaphragm.

163. Mutual Inductance of two circuits, each on the other, is that portion of the inductance of one due to the magnetic field common to both.

164. NATURAL FREQUENCY.—Is the frequency with which a circuit will oscillate when supplied with energy and then left to itself. If

R = resistance
L = inductance
C = capacity
N = frequency per second

$$\text{then } N=\frac{1}{2\pi}\sqrt{\frac{1}{LC}-\frac{R^2}{4L^2}}$$

165. NOTE OR TONE TUNING.—A receiver is tuned to the note of the transmitter when a circuit or part of the indicator is designed to resonate to the spark frequency.

166. OSCILLATIONS.—See alternating Currents, Free and Forced, also Current, Damped Alternating.

167. OSCILLATOR, ARC.—See Arc Oscillator.

168. OSCILLOGRAPH.—" An apparatus for observing or recording quickly varying currents or potential differences " (B.E.C.).

169. PERIOD, PERIODIC TIME.—" Any varying quantity which repeats its values regularly at equal time-intervals is said to be periodic, and the time-interval of one repetition is called the periodic time or period " (B.E.C.).

170. PERMEABILITY of a medium.—The ratio of the magnetic flux density produced in that medium by a given magnetomotive force to the magnetic flux density produced by the same magnetomotive force in vacuum (or, for practical purposes, in air).

171. PHASE.—" (*a*) In an operation which recurs periodically the stage or state to which the operation has proceeded.

" (*b*) In an operation which recurs periodically the fraction of the whole period which has elapsed, measured from some fixed origin " (B.E.C.).

172. PHASE DIFFERENCE.—" The difference of phase (usually reckoned in time or in angle) between two periodic quantities which vary harmonically. Each of the circuits of a polyphase apparatus is sometimes called a phase " (B.E.C.).

173. PLAIN AERIAL.—An early form of transmitter in which the spark gap was placed directly in series with aerial and earth, so that the only condenser in which the energy of the transmitter could be stored was the capacity of the aerial to earth.

The term is also applied to the receiving circuit when the detector is placed directly in series with the receiving aerial and earth.

174. POLARISATION of a wave.—A wave is said to be plane polarised when its electric and magnetic displacements are propagated on the same plane.

When the plane of the electric and magnetic displacement rotates uniformly with time, the waves are said to be circularly or eliptically polarised.

Such waves result from the compounding of two plane polarised waves having the same frequency and line of propagation but different relative phases and polarised in different planes.

175. Potentiometer.—An instrument for adjusting at will the potential between any two parts of a circuit.

An instrument for measuring potential difference.

176. Potential.—See Electrical Potential.

177. Power.—The amount of work done in unit time.

178. Power, Apparent.—In an alternating electric circuit this is the product volts $\times$ ampères.

179. Power Factor.—" The ratio of the watts to the volt-ampères. In the case of voltage and current of sine form the power factor is cos φ " (B.E.C.). In an oscillating circuit $\cos \varphi = \pi$ where δ is the decrement.

180. Quenched Spark.—A spark whose duration is shortened by conditions at the discharger designed to rapidly increase the resistance at the spark gap is said to be " quenched."

181. Radiation Resistance.—The resistance which multiplied by the square of the R.M.S. current in the aerial equals the energy lost by the aerial in radiation.

182. Radiation, Sustained.—See Waves, Sustained.

183. Radiogram.—A telegram sent by radio.

184. To Radiograph (verb).—To send a radiogram.

185. Radio Telephone.—An apparatus for the transmission of speech by radio.

186. Radiophone (noun).—A telephone message sent by radio.

187. To Radiophone (verb).—To send a radiophone.

188. Reactance of a circuit is a function of the inductance, capacity, and the impressed frequency.

An inductance has reactance $2\,\pi \times$ frequency $\times$ inductance.

A capacity has reactance

$$\frac{1}{2\,\pi \times \text{frequency} \times \text{capacity}}$$

An inductance in series with a capacity has reactance equal to the sum of the reactance of the inductance and the reactance of the condenser.

Under conditions of resonance in a circuit the reactance of the capacity neutralises the reactance of the inductance and the resulting reactance is zero.

189. Rectifier.—An apparatus for converting alternating or oscillating currents into continuous current, or into pulses of undirectional current. Rectifier, Electron.—A device for rectifying an alternating current by utilizing the approximately unilateral conductivity between a hot cathode and a relatively cold anode in so high a vacuum that a pure electron current flows between the electrodes.

190. Rectifier, Gas.—An electron rectifier containing gas which modifies the internal action by the retardation of the electrons or the ionization of the gas atoms.

191. Reflection of Electromagnetic Waves.—(1) When a wave reaches the interface between two media of different dielectric constants its energy does not wholly pass from one medium to the other,

but in part remains in the first medium in a reflected wave which travels back from the interface. When the dimensions of the separating surface are large compared with the wave-length the laws of reflection of electromagnetic waves are in general the same as for light.

(2) When waves are being guided by a conductor, such as a wire which has a certain inductance and capacity per unit length, any abrupt change in the value of these constants (such as are produced by inserting an inductance coil, or occur at the end of the wire) causes the production of alternating potentials which result in a wave which travels along the wire in the opposite direction. This second wave is also called a reflected wave.

192. REFRACTION.—The change in the direction of a wave propagation when passing from one medium to another.

193. RELAY.—An apparatus by means of which a current, too small to perform a required work, is made to control a larger and adequate current.

194. RELAY, ELECTRON.—A device provided with means for modifying the pure electron current flowing between a hot cathode and a relatively cold anode placed in as nearly as possible a perfect vacuum.

These means may be, for example, an electric control of the pure electron current by variation of the potential of a grid interposed between the cathode and the anode.

195. RELAY, GAS.—An electron relay containing gas which modifies the internal action by the retardation of the electrons or the ionization of the gas atoms.

196. RELAY KEY.—An electrically operated key. See further, Key.

197. RESISTANCE.—The measure of that property of a conductor by the action of which electrical energy is transformed into heat in that conductor. It is numerically equal to the ratio of the heat energy liberated per second, measured in watts, to the square of the current in the circuit, for stationary conditions; it is also equal to the ratio of the applied electromotive force to the resulting current, both being constant.

198. RESISTANCE, ANTENNA.—See Antenna Resistance.

199. RESISTANCE, CRITICAL, OF A CIRCUIT.—That resistance which determines the limiting condition at which the oscillatory discharge of a circuit passes into an aperiodic discharge.

200. RESISTANCE, EFFECTIVE, OF A SPARK.—The ratio of the power dissipated by the spark to the mean square current.

201. RESISTANCE, RADIATION.—This is the ratio of the total energy radiated (per second) by the antenna to the square of the R.M.S. current at a potential node (generally the ground connection). See further, Antenna, Resistance.

202. RESISTANCE, RADIO FREQUENCY.—This is the ratio of the heat produced per second in watts to the square of the R.M.S. current (R.F.) in ampères in a conductor.

203. RESONANCE.—Resonance of a circuit to a given exciting alternating E.M.F. is that condition due to variation of the inductance or capacity in which the resulting effective current (or voltage) in that circuit is a maximum.

NOTE 1.—Instead of varying the inductance and capacity of a circuit the frequency of the exciting field may be varied. The condition of resonance is determined by the frequency at which the current (or voltage) is a maximum.

NOTE 2.—The resonance frequency corresponds the more accurately to the frequency of the free oscillations of a circuit, the lower the damping of the exciting alternating field and of the excited circuit.

A circuit will resonate to an impressed frequency when the reciprocal of 2 π times the square root of the product of inductance and capacity is equal to the impressed frequency and provided that its resistance is less than the critical resistance. Under conditions of resonance the amplitudes of successive half-periods of the resultant current gradually increase to a maximum which is dependent only on the impressed electromotive force and the resistance of the circuit, including radiation.

204. RESONANCE, ACOUSTIC DEVICE.—See Device, Acoustic Resonance.

205. RESONANCE CURVE.—A curve showing the relation between the current induced in an oscillatory circuit and the inducing frequency.

206. RESONANCE, SHARPNESS OF.—See Tuning, Sharpness of.

207. ROOT-MEAN-SQUARE VALUE.—R.M.S. value of an alternating or oscillating current or voltage is the value given by the square root of the mean of the squares of the successive values throughout the half period.

In a current or voltage of strict sine-wave form (sinusoidal) the R.M.S. value is equal to the maximum multiplied by ·707—*i.e.*, $(1/\sqrt{2})$. The R.M.S. value is also called the effective or virtual value.

208. SELECTIVITY.—The power of a receiving system to discriminate between a number of simultaneous signals.

209. SELF-INDUCTANCE of a circuit.—That portion of the inductance which is due to the magnetic field produced by the current in that circuit. See also Inductance.

210. SHARPNESS OF TUNING.—The measure of the rate of diminution of current in transmitters and receivers with detuning of the circuit which is varied.

If d_2 is the decrement of the free alternating current in the circuit and d_1 the decrement of the exciting E.M.F., then the sharpness of tuning is arbitrarily defined as $\frac{\pi}{d_1+d_2}$.

211. SHOCK EXCITATION.—A name given to the method of exciting oscillations in the aerial circuit by a sudden and very short transference of energy from another circuit.

212. SKIN EFFECT OF VARYING CURRENTS.—The non-uniform current density through the cross-section of the conductor. It is greatest at the surface and least at the centre.

213. SPARK.—An electrical discharge across a gap. It may consist of one discharge in either direction, but generally consists of a number of rapid oscillatory discharges.

214. SPECIFIC INDUCTIVE CAPACITY.—See Dielectric Constant.

215. Static.—Disturbances caused by atmospheric charging of the antenna.

Note.—When it is definitely known that disturbances are due to atmospheric charging of the antenna, the word " Static " shall be used. In general, disturbances shall be called " Strays."

216. Strays.—Electromagnetic disturbances set up by distant charges.

217. Syntony and Syntonisation.—The adjustment of one circuit to another, or of one transmitter taken as a whole to one receiver taken as a whole, in such a way that their time-periods are the same and waves of a different time-period produce little or no effect on the system.

218. Telegraphy, Radio.—The art of sending and receiving radiograms.

219. Telephony, Radio.—The art of sending and receiving radiophones.

220. Ticker, Tikker.—A rapid make-and-break device used in conjunction with a resonant circuit and a pair of telephones as a receiver for continuous waves. It discharges the condenser of the resonant circuit at every make. The speed of the make-and-break device has no relation to the wave frequency.

221. Tone Wheel.—A high-speed commutator used as a receiver for continuous waves. It is run at a speed slightly different from the synchronous speed for the wave frequency and in effect converts the high-frequency current into a current of audible frequency.

222. Train of Waves.—The waves produced by one discharge of the primary condenser in a spark circuit.

223. Transformer.—A stationary induction apparatus for transferring energy from one circuit to another by the medium of magnetic energy.

It may or may not transform the current into another current at different potential. In present radio practice the term should be restricted to audio frequency transformers. See Frequency, Audio.

224. Transmission, Diplex.—See Diplex Transmission.

225. Tuner.—An apparatus made in a convenient form, which in conjunction with a detector provides all necessary circuits and adjustments for selective tuning.

226. Tuning.—The process of securing the maximum indication by adjusting the time period of a driven element. See Resonance.

227. Tuning, Sharpness of.—See Sharpness of Tuning.

228. Undamped Waves.—See Continuous Waves.

229. Vacuum Tube, Three Electrode.—As examples see Relays, Electron and Gas.

230. Vacuum Tube, Two Electrode.—As examples see Rectifiers, Electron and Gas.

231. Valve, Fleming.—A detector for oscillations. It depends on the rectifying properties of the ionised space between a hot filament and a cold electrode in an exhausted vessel.

232. Waves, Electromagnetic.—A periodic electromagnetic disturbance progressive through space.

233. WAVE LENGTH.—Twice the distance (taken in the line of propagation of the wave) between two successive points of zero disturbance; or the distance between two consecutive maxima, of the same sign. The wave length is numerically equal to the velocity of the waves divided by the frequency.

234. WAVE LENGTH (OF AN ELECTROMAGNETIC WAVE).—The distance in metres between two consecutive maxima of the same sign. The wave length is numerically equal to the velocity of the waves (3×10^{10} cms. per second) divided by their frequency.

235. WAVE LENGTH, FUNDAMENTAL.—See Fundamental Wave Length.

236. WAVE LENGTH, NATURAL.—In a loaded antenna (that is, with series inductance or capacity) the natural wave length corresponds to the slowest free oscillation.

237. WAVE CHANGER.—See Changer, Wave.

238. WAVE METER.—A radio frequency measuring instrument calibrated to read wave lengths.

239. WAVES, SUSTAINED.—Waves radiated from a conductor in which an alternating current flows.

240. WAVE TRAIN.—See Train of Waves.

DICTIONARY OF TECHNICAL TERMS

Specially Compiled for the "Wireless Year-Book" under the supervision of Dr. ERSKINE MURRAY, D.Sc., F.R.S.E., M.I.E.E.

English.	French.	Italian.	Spanish.	German.
Accumulator batteries	Batterie d'accumulateurs	Batterie di accumulatori	Acumuladores, Baterias de	Accumulatoren Batterie
Aerial, balancing	Antenne de compensation	Antenna di compensazione	Antena compensadora	Wage Antenne
Aerial, directional	Antenne dirigée	Antenna dirigibile	Antena dirigida	Gerichtete Antenne
Aerial, direction-finder	Antenne réception dirigée	Antenna, rivelatrice della direzione	Antena para busca de direcciones	Antenne, zur Entdeckung der Richtung
Aerial, horizontal	Antenne horizontale	Antenna orizzontale	Antena horizontal	Horizontaler Luftleiter
Aerial, receiving	Antenne de réception	Antenna di ricezione	Antena de recepcion	Empfangsdraht
Aerial, transmitting	Antenne d'émission	Antenna di trasmissione	Antena de transmission	Geberdraht (Sendeluftleiter)
Aerial, umbrella	Antenne en parapluie	Antenna a forma di ombrella	Antena de paragua en forma	Schirmnetz
Ammeter, a.c.	Ampèremètre pour courant atternatif	Amperometro per corrente alternata	Amperimetro, c.a.	Wechselstromamperemeter
Ammeter, d.c.	Ampèremètre pour courant continu	Amperometro per corrente continua	Amperímetro, c.c.	Gleichstromamperemeter
Ammeter, hotwire	Ampèremètre à fil chaud	Amperometro a filo caldo	Amperímetro térmico	Hitzdrahtamperemeter
Ammeter, moving coil	Ampèremètre d'Arsonval	Amperometro a bobina mobile	Amperímetro de bobina movil	D'Arsonvalscher Amperemeter
Angle divider	Diviseur d'angle	Divisore di angoli	Divisor de Angulo	WinkelTrennungs-Apparat
Antenna	Antenne	Antenna	Antena	Luftleiter (Antenne)
Antenna, horizontal extension of	Branche horizontale de l'antenne	Fili orizzontali dell' antenna	Antena, Prolongación horizontal de la	Horizontale Verlangerungsdrahte des Luftleiters
Antenna, T-shaped	Antenne en T.	Antenna a forma di T.	Antena en forma de T.	T. formige Antenne
Antenna, extended T-shaped	Antenne en T. à branches horizontales prolongées	Antenna a forma di T. allungata	Antena en forma de T. prolongada	Verlängerte T. Luftleiter
Apparatus, receiving	Appareils de réception	Apparecchi di ricezione	Aparatos receptores	Empfanger
Apparatus, transmitting	Appareils de transmission	Apparecchi di trasmissione	Aparatos transmisores	Sender
Arrester, earth terminal	Eclateur de mise à terre	Morsetto per presa di terra	Espacio de chispa de tierra	Unterbrochener Erdanschlusz
Arrester, lightning	Parafoudre	Dispositivo scaricafulmine	Pararrayos	Blitzschutz
Atmospherics	Perturbations atmosphériques	Perturbazioni atmosferiche	Perturbaciones Atmosféricas	Luftstoerungen

Busbars, main-	Barres omnibus principales	Barre collettrici principali	Barras colectoras principales	Haupt Sammelschienen
Building, station-	Bâtiment du poste radiotélégraphique	Fabbricato della stazione	Edificio de la estación	Stationhaus
Buzzer	Vibrateur	Vibratore	Zumbador	Summer
Buzzer, practice	Vibrateur d'apprentissage	Cicala per la pratica della ricezione a udito	Zumbador para prácti	Ubungssummer
Capacity	Capacité	Capacità	Capacidad	Aufnahmefähigkeit
Cart, radiotelegraph	Voiture radiotélégraphique	Carro radiotelegrafico	Carro de radiotelegrafía	Funkenkarren
Change of connections for receiving	Commutation pour la réception	Commutazione per ricezione	Cambio de conexiones para la recepción	Umschaltung auf Empfangen
Change of connections for transmitting	Commutation pour la transmission	Commutazione per trasmissione	Cambio de conexiones para la transmisión	Umschaltung auf Senden
Chokes, air core protecting	Bobine de réactance sans noyau de fer	Bobine di protezione a nucleo d'aria	Bobinas de reactancia, protectoras, de núcleo de aire	Impedanzspulen fur hohe Frequenz mit Luftkern
Choking coil	Bobine d'impédance	Rocchetto d'autoinduzione	Bobina de reactancia	Drosselspule
Circuit breaker and closer	Disjoncteur et conjoncteur automatique	Interruttore	Interruptor con apertura y cierre automáticos	Strom - unterbrecher und Strom-schliesser
Circuit, closed oscillating	Circuit oscillant fermé	Circuito oscillante chiuso	Circuito oscilante cerrado	Geschlossener Erregerkreis
Circuit, intermediate	Circuit intermédiaire	Circuito intermedio	Circuito intermedio	Zwischenkreis
Circuit, open radiating	Circuit radiant ouvert	Circuito radiante aperto	Circuito radiador abierto	Offener Strahlungskreis
Circuit, oscillatory	Circuit oscillatoire	Circuito oscillante	Circuito oscilante	Schwingungskreis
Coherer	Cohereur	Ricevitore a coherer	Cohesor	Fritterempfänger
Coil, syntonising	Inductance de syntonisation	Rocchetto di sintonizzazione	Bobina de sintonización	Abstimmspule
Commutator	Commutateur	Commutatore	Conmutador	Stromwender
Commutator (of Dynamo)	Collecteur	Collettore	Colector	Stromwender
Condensers	Condensateurs	Condensatori	Condensadores	Kondensatoren
Condenser, adjustable	Condensateur règlable	Condensatore regolabile	Condensador variable	Variabler Kondensator
Condenser, adjustable disc	Condensateur à disque	Condensatore a disco regolabile	Condensador de disco, variable	Drehkondensator
Condenser, aerial tuning	Condensateur de syntonisation d'antenne	Condensatore per la sintonizzazione dell' antenna	Condensador de sintonización de la antena	Kondensator zur Luftleiterabstimmung
Condenser, air	Condensateur à air	Condensatore ad aria	Condensador de dialéctrico de aire	Luftkondensator
Condenser, calibration	Condensateur étalon	Condensatore per tarature	Condensador para calibración	Eichungskondensator
Condenser, circuit	Circuit du condensateur	Circuito del condensatore	Condensador, Circuito de	Kondensatorkreis
Condenser, intermediate circuit	Condensateur du circuit intermédiaire	Condensatore per il circuito intermedio	Condensador del circuito intermedio	Kondensator im Zwischenkreis

Dictionary of Technical Terms—*Continued*

English.	French.	Italian.	Spanish.	German.
Condenser, secondary circuit	Condensateur du circuit secondaire	Condensatore per il circuito secondario	Condensador del circuito secundario	Kondensator im Secundärkreis
Condenser, short wave	Condensateur de raccourcissement	Condensatore per onda corta	Condensador de onda corta	Verkürzungskondensator
Condenser-system	Système de condensateur	Sistema di condensatori	Sistema de Condensadores	Kondensatorsystem
Condensers, test-tube	Condensateurs à tube	Condensatori tubolari	Tubo para ensayo de condensadores	Kondensator Prüfröhre
Condenser, twin-coupled	Condensateur jumelé	Condensatore a doppio accoppiamento	Condensador de doble acoplamiento	Kondensator, doppelt geschaltete
Condensers, variable	Condensateurs réglables	Condensatori variabili	Condensadores variables	Variablerkondensatoren
Converter	Commutatrice	Convertitore	Convertidor	Drehumformer
Continuous wave	Onde entretenue	Onda continua	Onda continua	Kontinuierlische Welle
Continuous wave receiver	Recepeur pour ondes entretenues	Ricevitore d' onde non smorzate	Receptor para onda continua	Empfanger fuer kontinuierlische Welle
Coupling	Couplage	Accoppiamento	Acoplamiento	Kopplung
Couplings, flexible and insulating	Manchons d'accouplement souples et isolants	Accoppiamenti elastici ed isolanti	Acoplamientos flexibles y aisladores	Biegsame und isolierende Verbindungen
Current, alternating	Courant alternatif	Corrente alternata	Corriente alterna	Wechselstrom
Current, direct	Courant continu	Corrente continua	Corriente contínua	Gleichstrom
Current, primary alternating	Courant alternatif primaire	Corrente alternata del circuito primario	Corriente alterna primaria	Primär Wechselstrom
Cut-out, automatic	Interrupteur automatique	Interruttore automatico	Interruptor automático	Selbstunterbrecher
Cymometers	Cymomètres	Cimometri	Cimómetro	Wellenmesser
Damper	Sourdine	Sordina	Amortiguador	Dämpfer
Damping, high	Amortissement élevé	Forte smorzamento	Amortiguamiento, Gran	Grosse Dämpfung
Decremeter	Décrémètre	Decrimetro	Decrémetro	Dekremeter (Dampfungsmesser)
Detector, crystal	Détecteur à cristal	Rivelatore di onde a cristallo	Detector de cristal	Krystalldetektor
Detector, balanced crystal	Détecteur à cristal équilibré	Rivelatore a cristalli compensati	Detector de cristal compensador	Wellenanzeiger, bilanzierten Kristall
Detector, Fleming valve	Récepteur à valve d'oscillation " Fleming "	Rivelatore di onde con valvola di Fleming	Detector de Válvula, Fleming	Prof. Fleming's Valve-Empfänger
Detector, magnetic	Détecteur magnétique	Rivelatore di onde magnetico	Detector magnético	Marconi-Magnetdetektor

				asynchron
Discharger, disc, high-speed	Eclateur à disque à grande-vitesse	Scaricatore a disco ad alta velocitá	Descargador de disco de gran velocidad	Schnell rotierende Scheibenfunkenstrecke
Discharger, disc, smooth .	Eclateur à disque uni .	Scaricatore a disco a contorni lisci	Descargador de disco liso	Rotierende Scheibenfunkenstrecke-glatt
Discharger, disc, studded .	Eclateur à disque—muni de prisonniers latéraux	Scaricatore a disco con punte	Descargador de disco dentado	Rotierende Scheibenfunkenstrecke mit Zähne
Discharger, fixed . .	Eclateur fixe . . .	Scaricatore fisso . .	Descargado fijo . .	Scheibenfunkenstrecke, fixierter
Discharger, micrometric spark	Eclateur à étincelle micromètrique	Scaricatore per la produzione di scintilla micrometrica	Descargador de chispa micrométrica	Mikrometerfunkenstrecke
Discharger, side electrodes	Eclateur à électrodes latérales	Scaricatore con elettrodi laterali	Descargador, electrodos laterales del	Scheibenfunkenstrecke, Seiten electroden
Discharger, synchronous .	Eclateur synchrone .	Scaricatore sincrono .	Descargador sincrono .	Scheibenfunkenstrecke, synchron
Duplex telegraphy . .	Télégraphe duplex .	Telegrafia duplex . .	Telegrafía duplex . .	Dupler Telegraphie
Earth connection . .	Connexion de terre .	Messa a terra . .	Conexión de tierra . .	Erd Verbindung
Efficiency . . .	Rendement . . .	Rendimento. . .	Rendimiento. . .	Wirkungsgrad
Frequency, high . .	Haute fréquence . .	Alta frequenza . .	Frecuencia, alta. . .	Hochfrequenz
Frequency, low . .	Basse fréquence . .	Bassa frequenza . .	Frecuencia, baja . .	Niedfrequenz
Frequency meter . .	Fréquencemètre . .	Frequenziometro . .	Frecuencímetro . .	Frequenzmesser
Generating plant . .	Générateur . . .	Impianto generatore .	Instalación generadora .	Stromanlage
Generator, c.c. . .	Dynamo . . .	Generatore di corrente continua	Generador de corriente contínua	Dynamo (Gleichstrom)
Hammer-break, magnetic.	Interrupteur à marteau.	Interruttore magnetico a martello	Interruptor magnético de martillo	Magnetischer Hammerunterbrecher
Inductance, aerial . .	Inductance d'antenne .	Induttanza dell' antenna	Inductancia de antena .	Antenneninduktanz
Inductance, aerial tuning.	Inductance à syntoniser le circuit de l'antenne	Induttanza per la sintonizzazione dell' antenna	Inductancia de sintonización de la antena	Induktanz zum Syntonisieren der Antenne
Inductance, low frequency	Bobine d'inductance du circuit à basse fréquence	Induttanza per il circuito a bassa frequenza	Inductancia del circuito de baja frequencia	Induktanzspule niedriger Frequenz
Inductance, primary .	Inductance primaire .	Induttanza per circuito primario	Inductancia primaria .	Primärinduktanz

Dictionary of Technical Terms—*Continued*

English.	French.	Italian.	Spanish.	German.
Inductance, primary syntonising	Inductance primaire de syntonisation	Induttanza sintonizzatrice del circuito primario	Inductancia primaria de sintonización	Primärinduktanz zum Abstimmen
Inductance, variable primary syntonising	Inductance primaire variable de syntonisation	Induttanza sintonizzatrice del circuito primario, regolabile	Inductancia variable de sintonización del primario	Veränderliche Primärinduktance zum Abstimmen
Induction coil	Bobine d'Induction	Rocchetto d'induzione	Bobina de inducción	Rhumkorffischer Funkeninduktor
Inkwriter, Morse	Appareil Morse enregistreur	Ricevitore scrivente Morse	Aparto Morse registrador	Schreibempfänger
Insulation	Isolation	Isolamento	Aislamiento	Isolierung
Insulator, leading-in	Isolateur d'entrée	Isolatore d'entrata	Aislador de entrada	Isolator, Einfuehrungs
Insulator, flexible	Isolateur souple	Isolatore elastico	Aislador flexible	Flexibler Isolator
Insulator, receiving	Isolateur de réception	Isolatore dell' antenna di ricezione	Aislador para circuito receptor	Isolator fur den Empfangsdraht
Insulator, transmitting	Isolateur de transmission	Isolatore dell' antenna di transmissione	Aislador para circuito transmisor	Isolator fur die Senderantenne
Interrupter	Rupteur	Interruttore	Interruptor	Unterbrecher
Interrupter, current-	Rupteur de courant	Interruttore di corrente	Interruptor de corriente	Stromunterbrecher
Interrupter, electrolytic	Rupteur électrolytique	Interruttore elettrolitico	Interruptor electrolítico	Wehnelt Unterbrecher
Interrupter, turbine	Turbo-rupteur à mercure	Interruttore a turbina	Interruptor de turbina	Quecksilberturbinenunterbrecher
Jigger	Transformateur d'oscillations	Trasformatore delle correnti oscillatorie	"Jigger"	Jigger, Selbst-induktion des Erregerkreises
Jigger, balanced	Jigger compensé	Trasformatore ad alta frequenza compensato	Jigger compensador	Jigger, bilanzierter
Jigger, primary	Primaire de transformateur d'oscillation	Circuito primario del transformatore delle correnti oscillatorie	"Jigger," primario del	Primär-Jigger
Jigger, secondary	Secondaire de transformateur d'oscillation	Circuito secondario del trasformatore delle correnti oscillatorie	"Jigger," secundario del	Sekundär-Jigger
Key-sending	Manipulateur	Tasto manipolatore di trasmissione	Manipulador	Taste

Leyden jar, battery of	Batterie de bouteilles de Leyde	Batteria di bottiglie di Leida	Botellas de Leyden, Bateria de	Batterie Leydener Flaschen
Lightning arrester. (*See* Arrester, lightning)				
Mast, portable	Mât, portatif.	Albero, portatile	Mástil, portátil	Tragbarer Mast
Masts, steel sectional	Mâts d'acier à sections	Albero di acciaio diviso in sezioni	Mástil de secciones de acero	Stahlmasten in Teilen
Mast, telescopic	Mât, télescopique	Albero telescopico	Mástil telescópico	Teleskopmast
Microphone apparatus	Appareil microphone	Apparecchio microfonico	Aparato microfónico	Microphon-Apparat
Micrometer, spark	Micromètre à étincelle	Micrometro per Scintilla	Micrometro de chispa	Funkenmikrometer
Motor alternator disc set	Groupe moteur alternateur avec éclateur à disque	Gruppo convertitore con scaricatore a disco	Grupo de motor, alternador con estallador de disco	Wechselstromgenerator kombiniert mit Rotierende Funkenstrecke
Multiple transmission and reception	Transmission et réception multiples	Trasmissionee Ricezione multipla	Transmisión y recepción múltiple	Vielfach Ubermittlung und Empfang
Oscillations, electric	Oscillations électriques	Oscillazioni elettriche	Oscilaciones eléctricas	Elektrische-Schwingungen
Overload	Surcharge	Sovraccarica	Sobrecarga	Überlast
Plant, radiotelegraphic	Installation radiotélégraphique	Impianto radiotelegrafico	Instalación radiotelegráfica	Radiotelegraphische Anlage
Potentiometer	Potentiometre	Potenziometro	Potenciómetro	Potentiometer
Radiogoniometer	Radiogoniomètre	Radiogoniometro	Radiogonometro	Radiogoinometer
Range	Portée	Portata	Alcance	Reichweite
Receiver	Appareil récepteur	Apparecchio ricevitore	Receptor	Empfänger
Receiver arrangement	Dispositif de réception	Dispositivo di ricezione	Dispositivo de recepcion	Empfangsvorrichtung
Receiver, balanced	Récepteur compensé	Rivelatore compensato	Receptor compensador	Empfanger, bilanzierter
Receiver, flexible	Récepteur souple	Ricevitore flessibile	Receptor flexible	Empfänger
Receiver, vacuum valve	Récepteur à valve d'oscillation	Ricevitore con valvola a vuoto	Receptor de válvula de vacio	Vakuum ventil Empfänger
Rectifiers	Rectificateurs	Raddrizzatori di corrente	Rectificador	Ausgleicher
Relay	Relais	Soccorritore	Relevador	Relais
Relay H.T.	Relais pour haute tension	Soccorritore ad alta tensione	Relevador A.T.	Hochspannungrelais
Relay magnets	Aimants du relais	Magneti di soccorritore	Imanes del relevador	Relais-magnete
Resistance, high	Haute résistance	Alta resistenza	Resistencia, alta	Hoher Widerstand
Resistance, low	Basse résistance	Bassa resistenza	Resistencia, baja	Niedriger Widerstand
Resistance, starting	Rhéostat de démarrage	Reostato di avviamento	Reostato de arranque	Anlasser
Resistance regulating	Rhéostat de champ	Reostato di campo	Resistencia de regulación	Regulierwiderstand

Dictionary of Technical Terms—*Continued*

English.	French.	Italian.	Spanish.	German.
Room, accumulator (battery)	Salle des accumulateurs	Stanza per la batteria di accumulatori	Sala de acumuladores (Batería)	Akkumulatorenraum
Room, operating	Salle de manipulation et réception	Ufficio radiotelegrafico	Sala telegráfica	Bedienungszimmer fur die Drahtloseinstallation
Room, transmitting	Chambre des appareils de transmission	Locale di trasmissione	Sala de manipulacion	Senderraum
Saddles, pack	Selles de paquetage	Basti	Bastes	Packsattel
Screening box	Boîte de garde	Cassetta di protezione	Caja de resguardo	Schutzkasten
Series rheostat	Rhéostat en serie	Reostato in serie	Reostato en serie	Serien Widerstand
Ship station	Station de bord	Stazione navale	Estación de á bordo	Schiffstation
Short circuiting device	Dispositif de mise en court circuit	Dispositivo di messa in corto circuito	Dispositivo de corto circuito	Kurzschliesser
Shunt, highly inductive	Shunt à pouvoir inductif élevé	Shunt ad alta induzione	Shunt altamente inductivo	Shunt mit hohe Selbstinduktion
Shunt, non-inductive	Shunt, non-inductif	Circuito in derivazione non-induttivo	Shunt, no inductivo	Nebenschlusz nduktionsfreier
Signals, balancing	—	Segnali equilibrati	Señales compensadores	Balanciersignale
Signals, telephone	Signaux téléphoniques	Segnali del telefono	Señales telefónicas	Telephonsignale
Span	Haubanage	Campata	Tirante	Abspannung
Spark	Etincelle	Scintilla	Chispa	Funke
Spark coil, with hammer-break	Bobine d'induction à interrupteur à marteau	Rochetto d'induzione a martello	Bobina de chispa con interruptor de martillo	Funkeninduktor mit Hammerunterbrecher
Spark gap	Eclateur à étincelle	Oscillatore	Espacio de chispa	Funkenstrecke
Spark gap, micrometric	Eclateur à intervalle micromètique	Oscillatore micrometrico	Espacio micrometrico	Micrometer Funkenstrecke
Spark micrometer	Micromètre à étincelles	Micrometro di scintilla	Micrómetro de chispa	Funkenmikrometer
Spark gap, multiple	Eclateur en série	Oscillatore multiplo	Espacio de chispa múltiple	Unterteilte Funkenstrecke
Spark gap, quenched	Eclateur pour étincelle étouffée	Spinterometro per oscillazioni smorzate	Descargador de chispa extinguida	Gedaempfte Funkenstrecke
Spark quenched	Etincelle étouffée	Scintilla smorzata	Chispa extinguida	Löschfunke
Sparking distance	Distance explosive	Distanza esplosiva	Distancia explosiva	Funkenstrecke
Starter, automatic	Démarreur, automatique	Avviatore automatico	Reostato de arranque, automático	Selbstanlasser
„ shunt regulator	avec rhéostat de champ	combinato con regola-	regulador de campo	[illegible]

		monofase	monofásico	
Starter, three-phase.	Démarreur tri-phasé	Avviatore per corrente trifase	Reostato de arranque trifásico	Dreiphasenanlasser
Station, aeroplane	Aéroplane (poste d')	Stazione per aeroplano	Estación para aeroplano	Flug-zeug Station
Station, airship	Station de ballon dirigeable	Stazione per aeronave	Estación para globos dirigibles	Luftschiffstation
Station, cart type	Station du type sur voiture	Stazione del tipo su carri	Estación tipo de carros	Karren station. Fahrbar- [station
Station, cavalry	Poste de cavalerie	Stazione per cavalleria	Estación de cavaleria	Kavalleriestation
Station, high-power.	Station à grande puissance	Stazione di grande potenza	Estación de gran potencia	Kraftstation
Station, knapsack	Poste dehavresac	Stazione da zaino	Estación de mochilas	Tornisterstation
Station, landing	Poste de débarquement	Stazione da sbarco.	Estación de desembarco	Landungsstation
Station, long-distance	Poste de grandes distances	Stazione ultrapotente	Estación de gran alcance	Radiotelegraphische Grossstation
Station, portable	Station portative	Stazione portatile	Estación portátil	Tragbarestation
Station, portable military.	Poste militaire transportable	Stazione militare mobile	Estación militar portátil.	Tragbare Militärstation
Station, radiotelegraph	Poste radiotélégraphique	Stazione radiotelegrafica.	Estación radiotelegráfica.	Funkenamt
Station, small-power	Station à faible puissance	Stazione di piccola potenza	Estación de pequeña potencia	Kleinstation
Swiss commutator	Commutateur suisse	Commutatore tipo svizzero	Conmutador suizo	Schweizerische Kommutator
Switch, aerial change-over	Commutateur d'antenne.	Commutatore dell'antenna	Conmutador para cambio de hilos de antena	Luftdrahtumschalter
Switch, aerial heating	Commutateur, échauffement d'antenne	Interruttore per riscaldamento dell'antenna	Conmutador de seguridad contra calentamiento de la antena	Umschalter zum heizen der Antenne
Switch, automatic	Interrupteur automatique	Interruttore automatico	Interruptor automático	Selbsttaetiger Schalte
Switch, automatic field break	Interrupteur automatique d'excitation	Interruttore automatico di eccitazione	Interruptor automático del campo	Selbsttaetiger Magnetausschalter
Switch, carbon break	Interrupteur à contacts de charbon	Interruttore a carbone	Interruptor con contactos de carbón	Kohlenschalter
Switch, change-over	Commutateur	Commutatore	Conmutador	Umschalter
Switch, change-tune	Commutateur de longeurs d'ondes	Commutatore di sintonizzazione	Conmutador de sintoinzacion	Wellenumschalter
Switch, charging	Interrupteur de charge	Interruttore di carica	Conmutador de carga	Ladeschalter
Switch, combined fuse and	Interrupteur avec coupe circuit	Fusibile ed interruttore combinati	Interruptor con fusible	Schalter und Sicherungkombiniert
Switch, double-bladed knife	Interrupteur bipolaire à lames	Interruttore doppio a coltello	Interruptor de cuchillo, bipolares	Doppelmesserschalter
Switch, double-pole	Interrupteur bipolaire	Interruttore bipolare	Interruptor bipolar	Zweipoliger Schalter
Switch, double pole, double throw	Commutateur bipolaire à deux directions	Interruttore bipolare a doppio effetto	Conmutador bipolar de dos posiciones	Zweipoliger Umschalter
Switchboard, d.c. and a.c..	Tableau de distribution pour courant continu et alternatif	Quadro di distribuzione per corrente continua ed alternata	Cuadro de distribución de c.a. y c.c.	Schalttafel fuer Gleich und Wechselstrom

Dictionary of Technical Terms—*Continued*

English.	French.	Italian.	Spanish.	German.
Switch, field-break	Interrupteur de l'excitation	Interruttore ad eccitazione	Interruptor del campo	Magnetausschalter
Switch, high-tension	Interrupteur pour haute tension	Interruttore per alta tensione	Interruptor de alta tensión	Hochspannungschalter
Switch, high-tension remote control	Tèlèinterrupteur pour haute tension	Interruttore ad alta tensione comandato a distanza	Teleinterruptor de alta tensión	Hochspannungsfernschalter
Switch, knife	Interrupteur unipolaire a lames	Interruttore a coltello	Interruptor de cuchillo	Messerschalter
Switch, main	Interrupteur principal	Interruttore principale	Interruptor principal	Hauptschalter
Switch, oil-break	Interrupteur à bain d'huile	Interruttore ad olio	Interruptor con baño de aceite	Oelschalter
Switch, press (toggle)	Interrupteur à pression	Interruttore a pressione	Interruptor de tornillo	Druckschalter
Switch, quick-break	Interrupteur à rupture brusque	Interruttore a scatto rapido	Interruptor de rotura brusca	Momentschalter
Switch, single-pole	Interrupteur unipolaire	Interruttore unipolare	Interruptor monopolar	Einpoligerschalter
Switch, three-phase	Interrupteur pour courant tri-phasé	Interruttore tripolare	Interruptor trifásico	Drehstromschalter
Switch, three-way	Commutateur à trois directions	Commutatore a tre vie	Conmutador de tres pasos	3 Wege Umschalter
Switch, voltmeter	Interrupteur du voltamètre	Interruttore per voltometro	Interruptor para voltímetro	Voltmeterumschalter
Switch, wave-changing	Commutateur pour changement de longeur d'onde	Commutatore d'onda	Conmutador de cambio de onda	Wellen Umschalter
Syntonisation	Syntonisation	Sintonizzazione	Sintonización	Abstimmung
Syntonised wireless telegraphy	Télégraphie sans fil syntonisée	Radiotelegrafia sintonica	Telegrafía sin hilos sintonizada	Abstimmbare Drahtlosetelegraphie
Table, operating	Table de manipulation	Tavola per il servizio radio-telegrafico	Mesa de aparatos	Radiotelegrafischer Bedienungstisch (Apparattisch)
Tapper	Frappeur	Decoherer	Decohesor de martillo	Klopfer
Telegraphy, directional wireless	Radiotélégraphie dirigée	Radiotelegrafia a sistema dirigibile	Telegrafía sin hilos dirigida	Gerichtete Drahtlose Telegraphie
Transformer	Transformateur	Trasformatore	Transformador	Transformator
Transformer, high-frequency oscillation	Transformateur d'oscillation à haute fréquence	Trasformatore delle correnti oscillatorie ad alta frequenza	Transformador de oscilaciones de alta frecuencia	Umformer fuer Hochfrequenzschwingungen

Transmitting arrangement	Dispositif d'emission	Dispositivo di trasmis-	Dispositivo de transmision	Senderanordnung
Transmitter cavalry	Transmetteur pour cavalerie	Trasmettitore di stazione per cavalleria	Transmisor para estación de cavaleria	Kavalleriesendeapparat
Transmitter, inductive	Transmetteur à couplage inductif	Trasmettitore ad accopiamento induttivo	Transmisor de acoplamiento de induccion	Gekoppelte Sender
Transmitter, sharply-tuned	Transmetteur à syntonisation aiguē	Trasmettitore acutamente sintonizzato	Transmisor de sintonización aguda	Scharf abgestimmte Sender
Transmitter, simple (P.A.)	Dispositif d'emission directe	Trasmettitore semplice	Transmisor sencillo	Einfacher Sender
Tremblers	Trembleurs	Interruttore a martello	Tembladores	—
Trembler, cantilever	—	—	Temblador de canecillo	—
Trench, covered in for wiring	Canalisation souterraine	Fossa coperta per cavi elettrici	Zanja cubierta para cables	Abgedeckter Kabelgraben
Tube, ebonite	Tube en ébonite	Tubo di ebanite	Tubo de ebonita	Ebonitroehre
Tuning	Syntonisation	Sintonizzazione	Sintonización	Abstimmen
Tuning, flat	Syntonisation non aiguē	Sintonizzazione piana	Sintonización aplastada	Unscharfes Abstimmen
Tuner, multiple	Syntonisateur multiple	Sintonizzatore multiplo	Sintonizador múltiple	Vielfach Abstimmapparat
Tuning, note	Hauteur de la note	Sintonizzazione della nota	Sintonización de la nota	Tonhöhe der Abstimmung
Tuning, note and wave	Note et onde de syntonisation	Sintonizzazione della nota e dell' onda	Sintonización de la nota y de la onda	Abstimmen von Tonhöhe und Welle
Tuning wave	Onde de syntonisation	Sintonizzazione della onda	Sintonización de la onda	Welle der Abstimmung
Undamped wave. (*See* Continuous wave)				
Valve	Valve	Valvola	Válvula	Ventil
Valve, vacuum	Valve à vide	Valvola a vuoto	Válvula de vacio	Vakuumventil
Voltage	Voltage	Potenziale	Voltaje	Spannung
Voltmeter, a.c.	Voltmètre pour courant alternatif	Voltometro per corrente alternata	Voltímetro c.a.	Voltmeter fur Wechselstrom
Voltmeter, aperiodic	Voltmètre apériodique	Voltometro aperiodico	Voltímetro aperiodico	Aperiodisches Voltmeter
Voltmeter, d.c.	Voltmètre pour courant continu	Voltometro per corrente continua	Voltímetro c.c.	Voltmeter fuer Gleichstrom
Voltmeter, hotwire	Voltmètre à fil chaud	Voltometro a filo caldo	Voltímetro térmico	Hitzdrahtvoltmeter
Voltmeter, switch	Interrupteur de voltmètre	Interruttore per voltometro	Voltímetro, interruptor para	Voltmeterumschalter
Wagon apparatus	Voiture portant les appareils	Carro per gli apparecchi	Aparatos sobre carros	Apparatekarren
Wagon, dynamo	Voiture portant le générateur	Carro per il generatore	Dinamo sobre carros	Kraftkarren-Kraftwagen
Wavelength	Longueur d'onde	Lunghezza d'onda	Longitud de onda	Wellenlaenge
Wavemeter	Ondemètre	Ondametro	Ondámetro	Wellenmesser
Waves, radiation of	Radiation des ondes	Irradiamento di onde	Radiación de las ondas	Ausstrahlung der Wellen

USEFUL FORMULAE AND EQUATIONS

Compiled under the supervision of Dr. ERSKINE MURRAY, D.Sc., F.R.S.E., M.I.E.E

(The names of the Authors are given in square brackets).

SUBJECT	FORMULA			NOTES
1. Practical Electromagnetic **Units** and **Symbols** in general use.	Current, I	Ampère	10^{-1}	The numbers give the values of the Practical Units in C.G.S. Electromagnetic Units. See also pp. 830–3, "Synopsis of Units," etc.
	Electromotive Force Voltage Pressure Difference of Potential	E or V Volt	10^{8}	
	Quantity of Electricity Q	Coulomb	10^{-1}	Small letters are used when the quantities are variable.
	Capacity, K or C	Farad microfarad	10^{-9} 10^{-15}	$KE=Q$
	Inductance, L	Henry microhenry	10^{9} 10^{3}	The C.G.S. Unit of inductance is also used in Wireless $=1$ cm.
	Resistance, R	Ohm	10^{9}	
2. **Work, Energy** and **Power**	Work or Energy, W	Joule Foot pound Kilogrammeter Kilowatt-hour	10^{7} $1{\cdot}356\times10^{7}$ $9{\cdot}8\times10^{7}$ $3{,}600\times10^{10}$	1 Joule $=1$ watt for 1 second. Work done in raising one pound one foot $=1$ foot pound.
	Power or Activity, P	Watt Kilowatt Horse Power	10^{7} 10^{10} 746×10^{7}	1 watt $=1$ amp. $\times$ 1 volt per second $=10^{7}$ ergs, an erg being the work done in producing an acceleration of one centimetre per second, per second, in the motion
	or 33,000 ft. lbs. per min. or 550 ft. lbs. per sec. [Watt]			

3. Relation between **Work** and **Heat.**	The Heat required to raise the temperature of one pound of water 1° F. is called Joules Equivalent $J=776$ ft. lbs. If the heat unit be one gram degree centigrade, Joules Equivalent $J=4{\cdot}2\times10^7$. [Joule] Heat produced by current in wire = Amps × Volts/4.2. [Joule]	Ergs. Gram-degrees Centigrade per second.
4. **Frequency, Wave-length,** and **Velocity of Waves.**	The velocity of Light and of Free Electromagnetic Waves $v=186{,}000$ miles per second $=3\times10^8$ metres per second [Fizeau] [Maxwell] λ = Wave-length, from crest to crest or positive to next positive. n = Frequency = cycles per second. T = Duration of one complete Cycle = Period. $T=1/n$; $\lambda=v/n$.	Symbol ~ also used for frequency. *E.g.* The period of a wave of frequency 500,000 is 1/500,000 sec., and since $600=3\times10^8/5\times10^5$ a 600 metre wave has a frequency of 500,000.
C.G.S. or **Absolute Units.**	(See Synopsis of Units, etc., pp. 830–3).	
5. **Capacities** . . . . *Capacity, condenser.*	(*a*) Sphere of radius $=r$ cms., in open space $=r/9\times10^5$ microfarads (*b*) Parallel Plate Condenser, A = Total area of working sides of plates connected to one terminal, in sq. cms. d = Distance between + and — plates in cms. k = Specific Inductive Capacity of Dielectric $K=\dfrac{Ak}{11{\cdot}31\times10^6\times d}$ . . . . mfd.	See table of Sp. Ind. Caps on p. 837. The Sp. Ind. Cap. of Air = 1.

SUBJECT	FORMULA	NOTES
5. **Capacity**—*cont.* *Capacity, Concentric Cylinders*	(*c*) Concentric Cylinders, r_1 = Outer radius of Inner Conductor r_2 = Inner of outer Conductor l = Length in cms. k = Specific Inductive Capacity of Dielectric $K = l/\left(4{\cdot}143 \times 10^6 \times \log \frac{r_2}{r_1}\right)$ . . . mfd.	Capacities in parallel $\frac{1}{K} = \frac{1}{K_1} + \frac{1}{K_2} + \&c.$ $\log \frac{r_2}{r_1}$; this log is the ordinary log to base 10.
Capacity, Horizontal Aerial.	(*d*) Horizontal Wire above Earth, l = Length in cms. d = Diameter in cms. h = Height above Earth in cms. $K = l/\left(4{\cdot}143 \times 10^6 \times \log \frac{2h}{d}\right)$ . . . mfd.	$\log \frac{2h}{d}$; this log is the ordinary log to base 10.
Capacity, Measurement of.	*To Measure Capacity.* (1) Put it in series with known Inductance and measure wave-length given out by the current when oscillating, or, (2) Put it in series with oscillating circuit having known capacity and measure change of wave-length (see 19 below). In (1) $K_1 = \lambda^2/3{,}600L$; in (2) $K_1 = K_2 \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2}$	λ, in metres. K, in microfarads. L, in cms., C.G.S.
6. **Capacity of Antenna**	K_1 = Capacity of the Antenna λ_1 = Wave-length of the Antenna λ_2 = Wave-length of the Antenna when an extra condenser of known capacity = K_2 is inserted in series. Then (see p. 817 below)	Note.—This method is only approximate. It gives best results when K_2 is large as compared with K_1.

	$\lambda_1 = 2\pi\sqrt{K_1 L}$ and $\lambda_2 = 2\pi\sqrt{\frac{K_1 K_2}{K_1+K_2} L}$ hence $K_1 = K_2 \frac{\lambda_1^2 - \lambda_2^2}{\lambda_1^2}$	Units K_1 and K_2 must be in same though any unit, likewise λ_1 and λ_2.
7. Inductance, Self . . .	Straight Wire, l = Length in cms. r = Radius in cms. L = Inductance in cms. (C.G.S. Units)	Divide by 10^3 to get microhenrys. Use ordinary logs.
Inductance, Straight Wire.	$L = 2l(2{\cdot}3026 \times \log\left(\frac{2l}{r}\right) - 1)$ [Neumann]	"
Inductance, Square.	Square made of round wire : l = whole length of wire in square in cms. $L = 2l(2{\cdot}3026 \times \log\left(\frac{l}{r}\right) - 1{\cdot}91)$ [Kirchhoff]	C.G.S. units.
Inductance, Circle.	Circle made of round wire ; a = Radius of Circle r = Radius of section of wire $L = 12{\cdot}57a\left[\left(1+\frac{r^2}{4a^2}\right)2{\cdot}3026 \times \log\left(\frac{8a}{r}\right) - 2\right]$ [Rosa] or approximately $L = 12{\cdot}57a(2{\cdot}3026 \times \log\left(\frac{8a}{r}\right) - 2)$ [Kirchhoff]	,,

SUBJECT	FORMULA	NOTES
Inductance, Solenoid.	*Solenoid, Long—i.e.*, in which the length is great as compared with the diameter. a = mean radius in cms. N_1 = number of turns per cm. b = length in cms. $L = 4\pi^2 a^2 N^2 b.$	C.G.S. units. $\pi = 3{\cdot}1416.$ $4\pi^2 = 39{\cdot}49.$
	Solenoid, Short. a = radius (measured to centre of wire). b = overall length, including insulation. N = total number of turns. $L = 4\pi a N^2 \left[2{\cdot}3026 \times \log\left(\frac{8a}{b}\right) - \frac{1}{2} + \frac{b^2}{32a^2}\left(2{\cdot}3026 \times \log\left(\frac{8a}{b}\right) + \frac{1}{4}\right)\right]$ [Rayleigh and Niven]	C.G.S. units. $4\pi = 12{\cdot}5664.$
	Another formula, approximate for any ratio of length to diameter. a = radius in cms. N = number of turns per cm. l = length. $L = 4\pi^2 \frac{a^2N^2}{l}\left(1 - \frac{8a}{3\pi l} + \frac{a^2}{2l^2} - \frac{a^4}{4l^4} + \frac{5a^6}{16l^6} \pm \text{etc.}\right)$ [Webster and Russell]	The inductance of two coils in parallel but having no mutual inductance, *i.e.*, either distant from one another or at right angles to one another. $L = \frac{L_1 L_2}{L_1 + L_2}$
8. **Inductance, Measurement of.**	To measure the inductance of a coil: (1) Connect it in series with a known condenser and measure the wave-length of the circuit; or (2) connect it in series with an oscillating circuit of known inductance and note the change of wave-length.	

9. **Inductance of Antenna, Measurement of.**	In (1) $L=\lambda^2/3600\,K$; in (2) $L=L_1\frac{\lambda_1^2-\lambda_2^2}{\lambda_1^2}$ The inductance of an antenna may be measured by a method similar to that given for capacity in 6.	L cms., C.G.S. K in microfarads and in λ metres.
10. **Inductance, Mutual, Measurement of.**	To measure the Mutual Inductance of two coils having self inductances L_a and L_b placed in a given position relative to one another. Connect the coils in series and measure the total self induction L_1 of the system. Reverse the connections on one coil only, thus reversing the current in it, measure L_2, then $L_1=L_a+L_b+M$ $L_2=L_a+L_b-M$ Hence $M=(L_1-L_2)/2$	
11. **Resistance** at High Frequencies.	*Straight Copper Wire* of radius $=r$ cms. R_o=Resistance to Direct Current (see Tables, pp. 830–3). R_n=Resistance at Frequency n. $R_n=R_o\left(1+\frac{1\cdot121}{10^5}n^2r^4-\frac{1\cdot007}{10^{10}}n^4r^8\right)$ [From Rayleigh's formula]	Note the resistance of manganin wire of about 0·8 mm. diameter is practically the same for D.C. as for wireless frequencies.
	Another formula— $R_n=R_o r\sqrt{0\cdot0058n}$ [From Rayleigh's formula]	When frequency very high.
12. **Electrical Energy** . .	Energy in Charged Condenser. $W=\frac{1}{2}QE$ $=\frac{1}{2}KE^2$ [Kelvin]	

SUBJECT	FORMULA	NOTES
Electrical Energy—*cont.*	If K in microfarads and E in volts, $W=\frac{1}{2.10^6}KE^2$ . . . . Joules (Watt-seconds) $=\frac{1}{72\times 10^{11}}KE^2$ . . . . kilowatt-hours. *Energy in Inductance Carrying Current.* If L in henrys and I in ampères, $W=\frac{1}{2}LI^2$ . . . Joules $W=\frac{1}{72\times 10^5}L\,I^2$ . . . kilowatt-hours.	
13. **Alternators**	Frequency (per second) = (revs. per min. × Number of Poles)/120. In the Goldschmidt H.F. Alternator the frequency is raised by addition of resonating circuits to stator and rotor—*e.g.*, if frequency as ordinary alternator be 10,000; frequencies of 20,000, or 30,000, or 40,000, etc., can be obtained in aerial circuit according to the intermediate circuits used.	
14. **Sine Curves**	The curve representing the equation $y=A.\ sin\ x$ is a simple sine curve, where A is the maximum value of y, or Amplitude. Usually the curve of an Alternator is not simple but represents $y=A_1\ sin\ x+A_2\ sin\ 2x+A_3\ sin\ 3x+$ . . . . these terms represent harmonics, where A_1, A_2, etc., are their amplitudes.	

15. **Simple Harmonic Motion.**	The equation $$y = \sin 2\pi nt$$ represents a simple periodic motion of frequency *n*.	t = time.
16. **Hot Wire Ammeters** .	High frequency Alternating and Interrupted Currents are usually measured by means of hot-wire ammeters. The quantity measured is not the actual current at any instant but the effective value of the current over a number of cycles or wave trains.	
R.M.S. Ampères.	The value indicated by a hot-wire instrument is the root of the mean square of the current = R.M.S. ampères.	For sine waves the R.M.S. amps. $= \frac{1}{\sqrt{2}}$ (maximum instantaneous current) = 0·707 (I_m).
17. **Impedance**	In an alternating current circuit the ratio volts/ampères is a constant and is called the Impedance. Impedance = Volts/Ampères	R.M.S. volts and ampères are applicable here.
	In a circuit having Inductance, Capacity and Resistance in Series, where $p = 2\pi n = 6{\cdot}28n$, $$\text{Imp} = Z = \sqrt{\left(pL - \frac{1}{pK}\right)^2 + R^2}$$ [Kelvin] R = Resistance ; $\left(pL - \frac{1}{pK}\right)$ = Reactance.	If the units are henrys, farads and ohms the impedance is equivalent to ohms.
	If there is no capacity in series—*i.e.*, a conducting circuit throughout, $$\text{Imp} = \sqrt{p^2L^2 + R^2}$$	See also 19.

SUBJECT	FORMULA	NOTES
18. **Exponential or Logarithmic Function.**	The equation $y = \varepsilon^{x}$ or, $\log_{\varepsilon}, y = x$ represents a law of variation of common occurrence in nature. For instance, in the form $y = \varepsilon^{-at}$ where a is a constant property chosen, the equation represents : (1) The charge y at any time t in a condenser which is leaking through a resistance ; (2) The curve through the successively decreasing maxima of a damped oscillation in a circuit of constant resistance. The equation $y = \varepsilon^{-ax} \sin bx$ represents a damped train of waves or oscillation.	$\varepsilon = 2{\cdot}71828$ and is the base of Napierian logarithms.
19. **Oscillatory Current** .	The equation giving the current at any moment in a damped oscillation is $i = I\ \varepsilon^{-at} \sin 2\pi nt.$ [Kelvin]	
Frequency.	The frequency of a free oscillation in a circuit not coupled to any other is $n = \sqrt{(4LK - R^2K^2)/4\pi LK}$ Or if R^2K^2 small and if K and L in C.G.S. Units $n = 1/2\pi\sqrt{KL}$ or $n = 159200/\sqrt{KL}$ if K in microfarads L in microhenrys	NOTE.—For oscillations to be possible R must be less than $\sqrt{4L/K}$. n is in complete cycles per second. $\lambda = v/n = 1885\sqrt{KL}$ metres.

Damping, Logarithmic Decrement.	If I_1, I_2, I_3, etc., be successive positive maximum values of current $I_1/I_2 = I_2/I_3 = \dots = \varepsilon^{dT}$ and $I_2/I_1 = I_3/I_2 = \dots = \varepsilon^{-dT} = \varepsilon^{-\delta}$ $dT = \log_e (I_1/I_2) = \delta$, and $d = n\delta$ hence (see above) $i = I\varepsilon^{-n\delta t} \sin 2\pi nt$ is the equation to an oscillatory current having log. dec $= \delta$ per cycle also if I_m be the mth maximum, $I_m/I_1 = \varepsilon^{-(m-1)\delta}$ since I_m is I_1 multiplied by $(m-1)$ factors each $= \varepsilon^{-\delta}$	T = period. δ = log. Decrement per whole period. Also, $\delta = R/2nL$.
Wave Train, useful length of.	Thus when the energy has fallen to 1/100 of that of first maximum and the current therefore to 1/10 $m = \frac{2 \cdot 3026 + \delta}{\delta}$ = a certain number of cycles.	This gives the useful length of a wave train when the decrement is known.
Damping of Spark Circuit.	In a circuit containing a gaseous section or spark, the resistance in general increases with the decrease of current; hence the decrement increases as the current dies out and the law is not logarithmic. From experimental determinations it is known that the decrement of a spark circuit is approximately a straight line and not a logarithmic curve—*i.e.*: $I_1 - I_2 = I_2 - I_3 = \text{constant} = D$. [Zenneck] Hence $I_n = I_1 - (n-1)D$ and the spark is extinguished and the current stops when $(n-1)\,D = I_1$ or $> I_1$	

SUBJECT	FORMULA	NOTES
Resonance Curve.	If a wavemeter—*i.e.*, a circuit having a standardised variable capacity, an inductance, and an indicator of current (usually a hot wire ammeter) in series—be placed so that current is induced in it by the action of another oscillating circuit, the current so induced varies with the nearness of the natural frequency of the wavemeter circuit to that of the inducing current. The curve obtained by plotting values of the square of the current in the wavemeter (I_2^2) against corresponding values of natural frequency of the wavemeter circuit (n_2) is called a resonance curve. When the frequency of the wavemeter is equal to that of any wave existing in the exciting circuit the current in the wavemeter runs up to a maximum and there is a peak on the curve. From the form and position of this peak or peaks the character of the exciting oscillation can be deduced. For instance, the frequency and damping of the exciting waves can be determined. [Bjerknes]	Wavemeter Indicator. A telephone is often used to find wave-lengths or frequencies only ; the reading of the wavemeter for maximum loudness being the wave-length of the exciting oscillation.
Determination of Decrement.	To determine the logarithmic decrement of a wave train or oscillation, If δ_1, δ_2 be the log. decrements of exciting circuit and wavemeter (the latter is small and is usually known), I_r be the wavemeter current at top of peak, its frequency being n_1, and I_s be current at a point near the top (frequency n_2) (say $I_s^2 = \frac{3}{4} I_r^2$), then $\delta_1 + \delta_2 = 2\pi \left(1 - \frac{n_2}{n_1}\right) \cdot \frac{I_s}{\sqrt{I_r^2 - I_s^2}}.$ It is not necessary to plot the whole curve since the measurement of the current I_r and I_s at frequencies n_1, n_2, is sufficient to solve the equation.	This gives the decrement δ_1 of the exciting oscillation if δ_2 be known. In a good wavemeter δ_2 is very small and may be put $= O$. The decrement may also be measured directly by the *Marconi* or the *Kloster* Decremeters.

Angle of Lag.	If the current in an alternating (or oscillating) circuit is always behind, or before, the voltage in arriving at corresponding values, the current is said to lag, or lead, and there is a difference of phase between current and voltage. The amount of lag or lead is measured by the difference in the phase angles of the harmonic motions representing current and voltage; this angle ϕ is called the angle of lag, or lead, $\tan\phi = \text{Reactance}/\text{Resistance} = \left(pL - \frac{1}{pK}\right)/R.$	$p = 2\pi n.$
Power Factor.	The power taken in, or given out and dissipated by a circuit in which the phase difference is ϕ is $P = \cos\phi\,(IE)$ $\cos\phi = \frac{\text{Resistance}}{\text{Impedance}} = \frac{R}{\sqrt{\left(pL - \frac{1}{pK}\right)^2 + R^2}} = \frac{\delta}{\pi}$ Hence the power taken by an oscillating circuit $P = \frac{\delta}{\pi}(IE).$	I and E are effective or hot-wire instrument values. δ = log. dec. Hence, when δ small $\cos\phi$ is small and power is small, and when δ large, other things being equal, the power taken is large.
20. **Coupled Circuits** . .	k = coefficient of coupling, or simply the coupling M = mutual inductance of the two circuits L_1, L_2 = self inductances of the two circuits. λ_0 = wave-length of each when free. λ_1, λ_2 = wave-lengths of component currents present in *both* circuits after coupling. δ_1, δ_2 = decrements of the circuits before coupling. d_1, d_2 = decrements of the component currents after coupling.	NOTE.—The coupling depends not only on the Mutual Inductance but also on the Self-Inductances of both circuits.

SUBJECT	FORMULA	NOTES
Coupled Circuits—cont.	$k = M/\sqrt{L_1 L_2}$ $\lambda_1 = \lambda_0 \sqrt{1-k}$ $\lambda_2 = \lambda_0 \sqrt{1+k}$ $d_1 = (\delta_1+\delta_2)/(2\sqrt{1-k})$ $d_2 = (\delta_1+\delta_2)/(2\sqrt{1+k})$ For the determination of k we may use $k^2 = \frac{\lambda_2^2-\lambda_1^2}{2\lambda_0^2}$ or less accurately $k = (\lambda_2-\lambda_1)/\lambda_0$.	Exact only in case of uniform (or undamped) current; approximate for slightly damped circuits with loose coupling—*i.e.*, less than $k=0{\cdot}05$, or 5 per cent. Measurements of λ_0, λ_1, and λ_2 with a wavemeter give k.
21. **Transmission** . . .	I_1 = sending antenna current. I_2 = receiving antenna current. h_1 = height of sending antenna. All in kilometres. h_2 = height of receiving antenna. ,, λ = wave-length. ,, d = distance between stations. ,, α = dissipation constant = 0·0015 in daylight over sea. $I_2 = 4{\cdot}25\, I_1 \frac{h_1 h_2}{\lambda d} \cdot \varepsilon^{-\alpha d/\sqrt{\lambda}}$. [Austin]	Receiving antenna supposed to have resistance about 25 ohms; which is common in practice. A current of 40 micro-ampères in the receiving antenna is necessary for good reception with ordinary detectors, but with audion amplifiers and similar arrangements much less is required.
22. **Efficiency of Transmitting Aerial-Earth Circuit** .	To find the efficiency of a transmitting antenna set up a small antenna at a few wave-lengths distant from the station. Put sensitive hot-wire ammeter in this antenna. Measure the current i, received when the current I_1, is in the station antenna. Lower	

	the station antenna about 10 per cent. of its height. Measure i_2 and I_2. In both cases the power P supplied to the station antenna and the wave-length must be made the same. Then, approximately, $$\text{Efficiency} = \eta\alpha = i_1^2 \frac{I_1^2 - I_2^2}{I_1^2 i_2^2 - I_2^2 i_1^2}.$$ Also if R be joulean resistance, and r be radiation of the antenna—earth circuit $$R = P \frac{i_2^2 - i_1^2}{I_1^2 i_2^2 - I_2^2 i_1^2}$$ $$r = P \frac{i_1^2}{I_1^2} \cdot \frac{I_1^2 - I_2^2}{I_1^2 i_2^2 - I_2^2 i_1^2}.$$ [Erskine-Murray]	$P = 2\pi n \delta L I^2$, where L is the inductance of the antenna. These formulæ are subject to some small corrections not given here.
23. **Rope,** Strength of .	Rough rule for all cordage except coir. Safe working $= c^2$ cwts., where c = circumference in inches	These are only roughly approximate.
	,, for wire ropes (hemp core) $= 9\,c^2$ cwts.	,, ,, ,,
	,, steel rope (wire core) $= 16\,c^2$ cwts.	,, ,, ,,
24. **Elongation of Stays** .	All-wire rope. Elongation $0{\cdot}25 \times S/c^2$ %	S = load in tons.
	Wire rope with one main hemp core. ,, $0{\cdot}3 \times S/c^2$ %	c = circumference in inches.
	Wire rope with main hemp core, and hemp core in each strand. ,, $0{\cdot}5 \times S/c^2$ %	
25. **Weight of Wire Rope**.	Weight in lbs. per fathom = square of circumference in inches.	

SUBJECT	FORMULA	NOTES
26. **Strength of Materials** .	WORKING STRESS. In Tension., Compression. Shear.	
Mild or Structural Steel . .	6 6 3.7 tons per sq. in.	
Oregon Fir	1,200 { 1,200 with grain lbs. per sq. in. 300 across grain ,, ,,	
Red Pine	900 { 800 with grain ,, ,, 200 across grain ,, ,,	
27. **Miscellaneous** . . .	1 Atmosphere = 14·7 lbs. per sq. inch. = 1 kilogram per sq. cm. 1 Radian = 57·29° ε = (base of Napierian Logs.) = 2·7183. Common Log. × 2·3026 = Napierian Log A man can work about $\frac{1}{8}$ h.p. For other data see Tables following.	

INTERNATIONAL UNITS AND SYMBOLS.

(The symbols have been taken by special permission from the report of the International Electrotechnical Commission. Copies of this report may be obtained from the General Secretary, 28, Victoria Street, London, S.W.)

RULES FOR QUANTITIES.

(*a*) Instantaneous values of electrical quantities which vary with the time to be represented by small letters. In case of ambiguity, they may be followed by the subscript "t."

(*b*) Virtual or constant values of electrical quantities to be represented by capital letters.

(*c*) Maximum values of periodic electrical and magnetic quantities to be represented by capital letters followed by the subscript "m.".

(*d*) In cases where it is desirable to distinguish between magnetic and electric quantities, constant or variable, magnetic quantities to be represented by capital letters of either script, heavy-faced or any special type. Script letters to be only employed for magnetic quantities.

(*e*) Angles to be represented by small Greek letters.

(*f*) Dimensionless and specific quantities to be represented, wherever possible, by small Greek letters.

SYNOPSIS OF UNITS.

		Dimensions
I.—Fundamental.		
Length—Mass—Time		L—M—T
II.—Derived Mechanical.		
Area	$=L \times L$	L^2
Volume	$=L \times L \times L$	L^3
Velocity	$V=L \div T$	LT^{-1}
Momentum	$=$ mass $\times$ velocity	$L\,M\,T^{-1}$
Acceleration	$A=$ velocity $\div$ time	LT^{-2}
Force	$F=$ mass $\times$ acceleration	$L\,M\,T^{-2}$
Work	$W=$ force $\times$ length	$L^2\,M\,T^{-2}$
Energy (kinetic)	$=\frac{1}{2}$ mass $\times$ velocity ^{2}	$L^2\,M\,T^{-2}$
III.—Derived Electro-Static.		
Quantity	$q=vQ=\sqrt{\text{force} \times \text{distance}^2}$	$L^{\frac{3}{2}}\,M^{\frac{1}{2}}\,T^{-1}$
Current	$c=vI=$ quantity $\div$ time	$L^{\frac{3}{2}}\,M^{\frac{1}{2}}\,T^{-2}$
Electro-motive Force / Difference of Potential	$e=\frac{E}{v}=$ work $\div$ quantity	$L^{\frac{1}{2}}\,M^{\frac{1}{2}}\,T^{-1}$
Resistance	$r=\frac{R}{v^2}=$ electro-motive force $\div$ current	$L^{-1}\,T$
Capacity	$k=v^2K=$ quantity $\div$ electro-motive force	L
Sp. Ind. Capacity	$=$ quantity $\div$ another quantity	a numeral
IV.—Derived Magnetic.		
Strength of Pole / Quantity of Magnetism	$m=\sqrt{\text{force} \times \text{distance}^2}$	$L^{\frac{3}{2}}\,M^{\frac{1}{2}}\,T^{1}$
Moment of a Magnet	$ml=$ strength of pole $\times$ length of poles	$L^{\frac{5}{2}}\,M^{\frac{1}{2}}\,T^{-1}$
Intensity of Magnetisation	$I=$ moment of magnet $\div$ volume	$L^{-\frac{1}{2}}\,M^{\frac{1}{2}}\,T^{1}$
Magnetic Potential	$=$ work $\div$ strength of pole	$L^{\frac{1}{2}}\,M^{\frac{1}{2}}\,T^{-1}$
V.—Derived Electro-Magnetic.		
Current	$C=\frac{c}{v}=$ intensity of field $\times$ length	$L^{\frac{1}{2}}\,M^{\frac{1}{2}}\,T^{-1}$
Quantity	$Q=\frac{q}{v}=$ current $\times$ time $=CT$	$L^{\frac{1}{2}}\,M^{\frac{1}{2}}$
Electro-motive Force / Difference of Potential	$E=ev=$ work $\div$ quantity	$L^{\frac{3}{2}}\,M^{\frac{1}{2}}\,T^{-2}$
Resistance	$R=rv^2=$ electro-motive force $\div$ current	$L\,T^{-1}$
Capacity	$K=\frac{k}{v_2}=$ quantity $\div$ electro-motive force	$L^{-1}\,T^2$
Sp. Ind. Capacity	$=$ displacement $\div$ force	$L^{-2}\,T$
Self-induction, or "Quadrant"	$L_s=\frac{ET}{C}=\frac{\text{energy}}{C^2}=\frac{H \times (\text{length})^2}{C}$	L
Ratio of electro-magnetic to electro-static unit of quantity, $v=3 \times 10^{10}$ centimetres per second approximately.		$L\,T^{-1}$

PRACTICAL ELECTRIC UNITS.

Resistance, R.—The Ohm is equal to 10^9 C.G.S.* units of resistance. It has been agreed to take as the practical unit of resistance the resistance of a specified column of mercury (B.A. Committee on Electrical Standards, 1892; Report of Electrical Standards Committee of the Board of Trade, October 27th, 1892). This specified column of uniform cross-section is defined by its length, 106·3 cm. at 0° C., and its mass, 14·4521 grammes. If the mass of 1 cc. of water at 4° C. be 1 gramme, the area of the cross-section of such a column will be 1 sq. mm. Thus 1 ohm is the resistance of a column of mercury at 0° C. 14·4521 grammes in mass, and 106·3 cm. in length. For industrial purposes standards in solid metal having the same resistance as this specified column are made and deposited at the Board of Trade and elsewhere. These standards are from time to time compared together, and have their values redetermined in terms of a mercury column.

To obtain the relation between resistances measured in B.A. units, and resistances measured in ohms, we have—

1 B.A. unit = ·9866 ohm.
1 ohm = 1·01358 B.A. Units.

Thus, to reduce B.A. units to ohms, we have to multiply by ·9866 (*i.e.*, deduct 1·34 per cent.). German silver coils having a temperature coefficient of resistance of ·044 per cent. per 1° C., adjusted to be B.A. units at 0° C., become ohms at 30°·5 C. Platinum silver coils, having a temperature coefficient of ·028 per cent. per 1° C., adjusted to be B.A. units at 0°, become ohms at 47°·8 C.

The Megohm = one million ohms.

The Microhm = one-millionth ohm.

The *Specific Resistance of Mercury* is thus $·9407 \times 10^{-4}$ ohms = 94·07 microhms.

The *Legal Ohm* of the Paris Congress, April, 1884, now superseded by the above B.O.T. ohm, is defined as the resistance of a column of mercury 106 cm. long, and 1 sq. mm. section at 0° C.

Electro-motive Force, E.—The Volt is equal to 10^8 C.G.S.* units of electro-motive force. The E.M.F. of a Clark cell at 15° C. is 1·434 volts. (See *B.O.T. Report.*) A Daniell cell, copper in copper sulphate solution and zinc in dilute sulphuric acid, gives about 1·04 volt. Electro-motive force is equivalent

* Electro-magnetic system.

to the difference of potential between two points. The VOLT is the electro-motive force which maintains a current of 1 ampère in a conductor whose resistance is the ohm.

CURRENT, I.—The AMPÈRE is the current, of which the absolute measurement is 10^{-1} C.G.S.* units.

One ampère decomposes ·00009324 gramme of water (H_2O) per second, or deposits 1·118 milligrms. of silver per sec. = 4·025 grms. per hour.

The MILLIAMPÈRE = $\frac{1}{1000}$ of an ampère.

QUANTITY, Q.—The COULOMB is equal to 10^{-1} C.G.S.* units of quantity. It is the quantity of electricity conveyed by an ampère in a second.

CAPACITY, K.—The FARAD is equal to 10^{-9} C.G.S.* units of capacity. It is the capacity defined by the condition that a coulomb charges it to the potential of a volt.

The MICROFARAD, *mfd.* = 10^{-15} C.G.S.* units of capacity, or one-millionth of a Farad.

SELF-INDUCTION, L^s.—The SECOHM,† Quadrant or Henry is equal to 10^9 centimetres or earth's quadrant.

POWER, P_w.—The WATT is equal to 10^7 C.G.S.* units of power. It is the power conveyed by a current of an ampère through a conductor whose ends differ in potential by a volt; or, in other words, the rate of doing work when an ampère passes through an ohm, and it is equal to 10^7 ergs per second, or a Joule per second ($\frac{1}{746}$ of a H.P.).

$$\therefore E \times I = I^2 \times R = E^2 \div R = \text{Watts},$$

$$\text{and} \frac{E \times I}{746} = \frac{I^2 \times R}{746} = \frac{E^2}{746\,R} = \text{Horse-power}.$$

The *Board of Trade Commercial Unit* is 1,000 volt-ampère-hours or 1,000 Watt-hours; 10 ampères at 100 volts an hour = one B.T. unit, or equal to 1·34 H.P. working for one hour.

HEAT OR WORK, WJ.—The JOULE is equal to 10^7 C.G.S.* units of work or ergs. It is the work done, or heat generated by a Watt in a second—*i.e.*, the work done or heat generated in a second by an ampère flowing through the resistance of an ohm, or the heat generated by a Coulomb running down through a difference of potential of 1 volt. It is therefore the amount of heat equivalent to 10^7 ergs. Assuming Joule's equivalent = 41,890,000 ergs, it is the heat necessary to raise ·24 gramme of water 1° C.

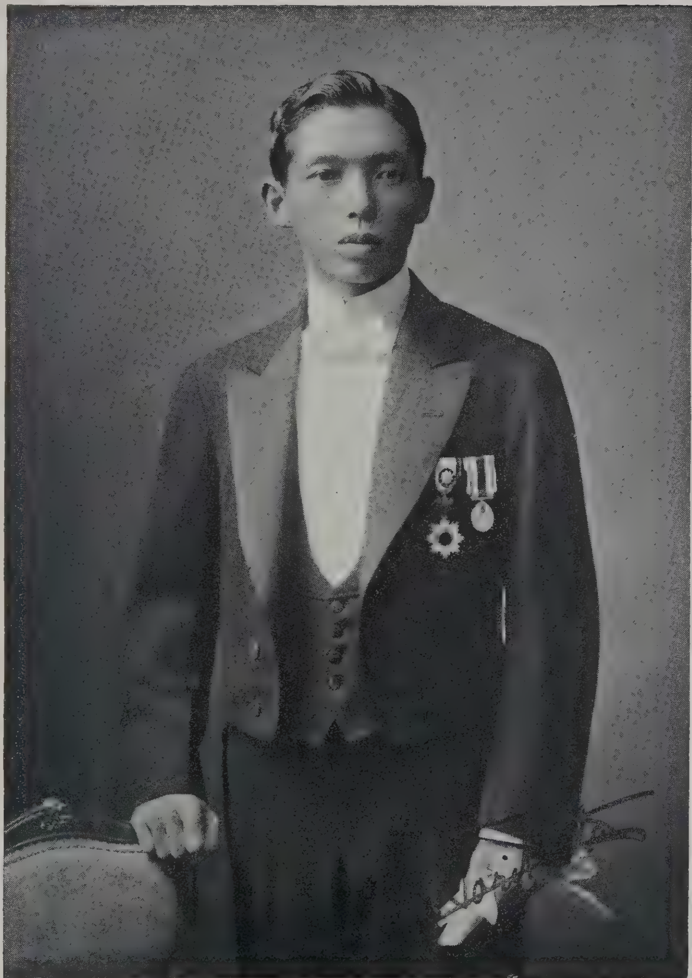
$$\therefore E\ I\ T = I^2\ R\ T = E^2\ T \div R = E\ Q \text{ Joules}.$$

And since 1 H.P. = 550 ft.-lbs. per second,

$$W = \tfrac{550}{746} E\ Q = {\cdot}7373\ E\ Q \text{ ft.-lb.}$$

* Electro-magnetic system.

† The "secohm" and "quadrant" were the terms used for self-induction until the "Henry" was officially adopted.



hoto by] [*R. Maruki, Tokio.*

DR. WICHI TORIKATA, CHIEF ENGINEER OF THE WIRELESS SECTION IN THE JAPANESE DEPARTMENT OF COMMUNICATIONS.

(For whose Biographical Notice see page 898.*)*

[*To face page* 832.

HEAT UNITS.

HEAT UNITS.—The French unit of heat is the quantity of heat required to raise 1 gramme mass of water, from 4° (temperature of maximum density) to 5° Cent. = 1 gramme degree Cent. = ·00397 British heat unit. The kilogramme degree Cent. in engineering is called the CALORIE. It is = 3·968 British units of heat (B.Th.U.).

The BRITISH THERMAL UNIT is the amount of heat required to raise 1 pound of water, from 60° Fah. to 61° = 1 pound degree Fah. = 0·2519 calories.

JOULE'S EQUIVALENT,* J, is the amount of ENERGY equivalent to a UNIT OF HEAT. Then, for

1 g.-deg. Cent., $J = 41{\cdot}89 \times 10^6$, say 42×10^6 ergs.
1 Calorie $J = 41{\cdot}89 \times 10^9$, say 42×10^9 ergs.
1 lb.-deg. Cent., $J = 1{\cdot}92 \times 10^{10}$ ergs, or 1,400 ft.-lbs.
1 lb.-deg. Fah., $J = 1{\cdot}07 \times 10^{10}$ ergs, or 778 ft.-lbs.

THE HEAT GENERATED in time, T, by a current, I, through a wire of resistance, R, is

$$\frac{I^2 R T}{J} \quad \frac{E I T}{J}$$

where $J = 42 \times 10^6$ and I, R, and E are expressed either in absolute electro-magnetic or electro-static units, and T in seconds.

For practical use, when I is ampères, R ohms, E volts, and T secs., the heat generated in time $T = I^2 R T \times 0{\cdot}24$; or $0{\cdot}24$ E I T calories. Or, ·0009 E I T British units.

* See *Science Abstracts*, vol. ii., p. 611, for Rowland's, Griffith's, Schuster's, or the latest values for J.

CONVERSION TABLES.

(By permission of the Proprietors of the Electrician.)

		Multiply by
To reduce	kilometres to miles	·62
,,	kilometres to yards	1100 (1093·6)
,,	metres to yards	1·1
,,	metres to feet	3·3
,,	centimetres to inches	·4
,,	millimetres to inches	·04
,,	millimetres to mils.	40 (39·4)
,,	miles to kilometres	1·6
,,	miles to metres	1609
,,	yards to kilometres	·0009
,,	yards to metres	·9
,,	feet to metres	·3
,,	inches to centimetres	2·54
,,	inches to millimetres	25 (25·4)
,,	mils. to millimetres	·025
,,	sq. metres to sq. yards	1·2
,,	sq. metres to sq. feet	11 (10·76)
,,	sq. centimetres to sq. inches	·155
,,	sq. millimetres to sq. inches	·0015
,,	sq. yards to sq. metres	·83
,,	sq. feet to sq. metres	·09
,,	sq. inches to sq. centimetres	6·45
,,	sq. inches to sq. millimetres	645
,,	cub. metres to cub. yards	1·3
,,	cub. metres to cub. feet	35·3
,,	cub. cms. to cub. inches	·06
,,	cub. yards to cub. metres	·76
,,	cub. feet to cub. metres	·03
,,	cub. inches to cub. cms.	16·4
,,	kilogrammes to tons	·001
,,	kilogrammes to cwt	·02
,,	kilogrammes to pounds	2·2
,,	kilogrammes to ounces	35 (35·3)
,,	grammes to ounces	·035
,,	grammes to grains	15·4
,,	milligrammes to grains	·015
,,	tons to kilogrammes	1000 (1016)
,,	cwt. to kilogrammes	50 (50·8)
,,	pounds to kilogrammes	·45
,,	pounds to grammes	453 (453·6)
,,	ounces to grammes	28·35
,,	grains to grammes	·65
,,	grains to milligrammes	65 (64·8)
,,	lbs. avoir. to grains troy	7000
,,	gallons to cub. feet	·16
,,	gallons to cub. metres	·0045
,,	gallons to litres	4·5
,,	gallons of water to lbs.	10
,,	cub. feet to gallons	6·2
,,	cub. metres to gallons	220
,,	litres to gallons	·22
,,	lbs. of water to gallons	·1
,,	litres to cub. feet	·035
,,	litres of water to lbs.	2·2
,,	cub. feet to litres	28·3
,,	lbs. of water to litres	·454
,,	cub. feet of water to lbs.	62·3 (62·27)
,,	lbs. of water to cub. feet	·016
,,	feet per minute to miles per hour	·0113
,,	feet per minute to metres per sec.	·005
,,	miles per hour to feet per minute	88
,,	metres per sec. to feet per minute	197
,,	tons per sq. foot to kilogrammes per sq. cm.	1·09
,,	tons per sq. foot to lbs. per sq. in.	15·5
,,	tons per sq. foot to head of water (feet)	36

		Multiply by
To reduce	tons per sq. foot to head of water (metres)	10·7
,,	tons per sq. foot to atmospheres	1·06
,,	lbs. per sq. inch to tons per sq. foot	·064
,,	lbs. per sq. inch to kilogrammes per sq. cm.	·07
,,	lbs. per sq. inch to grammes per sq. cm.	70·3
,,	lbs. per sq. inch head of water (feet)	2·3
,,	lbs. per sq. inch to head of water (metres)	·7
,,	lbs. per sq. inch to atmospheres	·07
,,	kilogrammes per sq. cm. to tons per sq. foot	·9
,,	kilogrammes per sq. cm. to lbs. per sq. inch	14·2
,,	kilogrammes per sq. mm. to lbs. per sq. inch	1422
,,	grammes per sq. cm. to lbs. per sq. in.	·014
,,	head of water (metres) to tons per sq. foot	·09
,,	head of water (feet) to tons per sq. foot	·027
,,	head of water (metres) to lbs. per sq. inch	1·4
,,	head of water (feet) to lbs. per sq. inch	·43
,,	atmosphere to tons per sq. ft.	·94
,,	atmosphere to lbs. per sq. in.	14·7
,,	grains per sq. inch to dynes per sq. cm.	9·8
,,	dynes per sq. cm. to grains per sq. inch	0·1
,,	carcels to candles	9·8
,,	candles to carcels	10·2
,,	English candles to German	1·1
,,	German candles to English	·92
,,	*joules to ergs	10
,,	joules to foot lbs.	·737
,,	joules to kilogrammetres	·1
,,	joules to lbs. deg. F.	·0095
,,	joules to calories	·24
,,	calories to joules	4·2 (4·158)
,,	lbs. deg. F. to joules	1048
,,	kilogrammetres to joules	9·8
,,	foot lbs. to joules	1·35
,,	lbs. deg. F. to foot lbs.	772
,,	lbs. deg. F. to kilogrammetres	107
,,	lbs. deg. F. to calories	252
,,	calories to lbs. deg. F.	·004
,,	kilogrammetres to lbs. deg. F.	·009
,,	kilogrammetres to calories	2·34
,,	kilogrammetres to foot lbs.	7·2
,,	foot lbs. to kilogrammetres	·14
,,	calories to kilogrammetres	·42
,,	H. P. to watts	746
,,	H. P. to foot lbs. per minute	33000
,,	H. P. to kilogrammetres per sec.	76
,,	watts to foot lbs. per minute	44
,,	watts to kilogrammetres per sec.	·1
,,	centimes per car-kilometre to pence per car-mile	·16
,,	pence per car-mile to centimes per car-kilometre	·2

* One *joule* = one *watt second.*

USEFUL DATA

RELATION BETWEEN SPARKING DISTANCES AND IMPRESSED VOLTAGE.

In the Standardisation Rules of the American Institute of Electrical Engineers, the following table of sparking distances in air between opposed sharp needle points for various effective sinusoidal voltages is given :—

Kilovolts sq. root of mean sq.	Inches sparking distance.	Kilovolts sq. root of mean sq.	Inches sparking distance.	Kilovolts sq. root of mean sq.	Inches sparking distance.
5	0·225	80	7·1	200	20·25
10	0·47	90	8·35	210	21·30
15	0·725	100	9·6	220	22·35
20	1·0	110	10·75	230	23·40
25	1·3	120	11·85	240	24·45
30	1·625	130	12·90	250	25·50
35	2·0	140	13·95	260	26·50
40	2·45	150	15·0	270	27·50
45	2·95	160	16·5	280	28·50
50	3·55	170	17·10	290	29·50
60	4·65	180	18·15	300	30·50
70	5·85	190	19·20		

Recent tests show that needle-point gaps are not reliable above 100,000 volts. A sphere gap voltmeter is recommended by S. W. Farnsworth and C. L. Fortescue (Proc. Am. Inst. E. E., Feb., 1913), and the tests made by the latter and L. W. Chubb give the following results :—

Diam. of Spheres in C.M.	Gap in C.M.	Volts.
25	2	60,000
25	4	112,000
25	6	165,000
50	8	215,000
50	10	260,000
50	14	350,000

SPECIFIC ELECTRICAL RESISTANCE TABLE.

METALS, ALLOYS, ELECTROLYTES, INSULATORS.

(By permission of the Proprietors of the Electrician.)

Metals and Alloys.

Metal or Alloy.	Resistance Compared with Copper (approx.)	Specific Resistance in C.G.S. Units at 0° C.	Temperature Coefficient per 1° C.
Aluminium, annealed	2	2,946	0·0039
,, hard-drawn... ...	2	3,160	0·0039
Antimony, pressed	22½	35,900	0·0039
Bismuth, pressed...	83	132,650	0·0054
Cadmium	6¼	6,800	—
Carbon, retort	42,000	67×10^6	—
,, arc light (Carré) ...	4,400	7×10^6	—0·0005
,, glow lamp (Edison-Swan)	2,500	4×10^6	—0·00054
Copper, soft	1	1,580	0·00388
,, hard	1	1,616	0·00388
German silver (Cu 4 parts, Ni 2 parts, Zn 1 part)	13¼	21,170	0·00044
Gold, purest soft	1⅓	1,952	0·00336
,, hard-drawn	1⅓	2,118	0·00365
Iron	6	9,611	0·0048
Lead, pressed	12¼	19,850	0·00387
Lead peroxide, chemically prepared	4×10^6	5590×10^6	—*
Lead peroxide, electrolytically prepared	4×10^6	6780×10^6	—*
Mercury, liquid	59	94,070	0·00072
Manganin (Cu 84 per cent., Mn 12 per cent., Ni 4 per cent.)	26	42,000	0° to 10° C. = +0·000025 10° to 20° C. = +0·000014 20° to 30° C. = +0·000003 30° to 40° C. = 0 40° to 50° C. = —0·000003 50° to 60° C. = —0·000006
Manganese copper (Cu 70 per cent., Mn 30 per cent.)	63	100,600	0·00004
Nickel, pure	7¾	12,290	0·0048
Platinum, pure annealed ...	5	8,222	0·0032
Platinoid (German silver +1 or 2 per cent. of Tungsten)	27¼	43,600	0·00025
Platinum iridium (Pt = 80 per cent., Ir = 20 per cent.)	18⅓	29,375	0·00089
Platinum silver (Pt = 33 per cent., Ag = 66 per cent.)	16¾	26,820	0·00018
Phosphor bronze, commercial ...	5⅓	8,479	0·00064
Silver, annealed	—	1,521	0·00377
,, hard-drawn	—	1,652	—
Tin, pure	6	9,565	0·004
,, pressed	8⅓	13,360	0·0036
Zinc, pressed	3½	5,690	0·0036

* John Shields, *Chem. News*, "No alteration observed on heating up to 115° C."

SPECIFIC INDUCTIVE CAPACITIES.

(*By permission of the Proprietors of the Electrician.*)

The *specific inductive capacity* of a substance is the ratio of the capacity of a condenser when the plates are separated by this substance to the capacity of the same condenser when its plates are separated by air at about 760 mm. pressure—no change being made in the condenser except in the substitution of air for the substance in question.

The determination of the specific inductive capacity of a substance does not admit of great accuracy on account of the phenomenon of absorption or soaking in of the charge which causes an apparent diminution * in the specific inductive capacity for charges of short duration as compared with those of long duration. The figures given in the following table should, therefore, only be regarded as approximately correct.

Substance.	Specific Inductive Capacity.	Authority.
Flint glass, very light, density 2·87	6·61	J. Hopkinson
,, light, density 3·2	6·72	J. Hopkinson
,, ,,	3·01	Wüllner
,, dense, density 3·66	7·38	J. Hopkinson
,, ,,	3·05	Wüllner
,, extra dense, density 4·5	9·90	J. Hopkinson
,, extra dense	3·16	Wüllner
Crown glass, hard, density 2·485	6·96	J. Hopkinson
,,	3·11	Wüllner
Plate glass	8·45	J. Hopkinson
,,	5·83 to 6·34	Wüllner
White mirror glass	5·83	Schiller
,, ,,	6·34	Siemens
Straw-coloured glass	2·96 to 3·66	Schiller
,, ,,	4·12	Siemens
Paraffin wax	1·977	Gibson & Barclay
,, ,,	1·96	Wüllner
,, ,,	2·32	Boltzman
,, ,,	1·68 to 1·92	Schiller
,, ,,	2·19 to 2·34	Siemens
Indiarubber, pure	2·12	Schiller
,, ,,	2·34	Siemens
,, vulcanised	2·69	Schiller
,, ,,	2·94	Siemens
Resin	2·55	Boltzman
Ebonite	2·21 to 2·76	Schiller
,,	3·15	Boltzman
,,	2·56	Wüllner
,,	2·28	Gordon
Sulphur	2·88 to 3·21	Wüllner
,,	3·84	Boltzman
,,	2·58	Gordon
Shellac	2·74	Gordon
,,	2·95 to 3·73	Wüllner
,,	3·15	Boltzman
Gutta-percha	4·2	Faraday
,,	2·46	Gordon
Mica	5·0	Faraday
Pitch	1·8	Faraday
Petroleum, spirit, Field's	1·92	J. Hopkinson
,, essence of	2·17	Perot
,, oil, Field's	2·07	J. Hopkinson
,, ,, common	2·10	J. Hopkinson
,, ,,	2·04 to 2·07	Silow
,, ,, neutral at 21° C.	2·26	E. B. Rosa
Turpentine, commercial	2·23	J. Hopkinson
,, ,, at 18·6° C.	2·43	E. B. Rosa
,, oil of, at 17·1° C.	1·94	Quincke
,, ,,	2·16 to 2·22	Silow
Castor oil	4·78	J. Hopkinson
Sperm oil	3·02	J. Hopkinson
,, at 20° C.	3·09	E. B. Rosa
Benzine	2·20	Silow
,,	2·24	Perot
,, at 21° C.	2·45	E. B. Rosa
Bisulphide of carbon at about 11° C.	1·97 to 2·22	Quincke
,, ,, ,, ,,	1·81	Gordon
Water at 14° C	83·8	Tereschin
,, 25° C.	75·7	E. B. Rosa
Air at about 0·001 mm. pressure	0·94	Ayrton
,, ,, 5 mm. ,,	0·9985	Ayrton
,, ,, ,, ,,	0·9994	Boltzman
Hydrogen at about 760 mm. pressure	0·9997	Boltzman
,, ,, ,, ,,	0·9998	Ayrton
Carbon dioxide at about 560 mm. pressure	1·0004	Boltzman
,, ,, ,, ,, ,,	1·0008	Ayrton
Olefiant gas at about 760 mm. pressure	1·0007	Boltzman
Sulphur dioxide at about 760 mm. pressure	1·0037	Ayrton

* According to M. Perot the reverse is sometimes the case with impure liquids

TABLE SHOWING RELATIVE VALUES OF STANDARD, BIRMINGHAM AND AMERICAN (BROWN & SHARPE) WIRE GAUGES.

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S.W.G.	B.W.G.	A.W.G.	Equivalent in Mils.	Equivalent in Mms.	S.W.G.	B.W.G.	A.W.G.	Equivalent in Mils.	Equivalent in Mms.
7/0			500	12·699	15	15	13	072	1·828
6/0			464	11·785		16		065	1·650
		0000	460	11·683	16		14	064	1·625
	0000		454	11·531		17		058	1·472
5/0			432	10·972			15	057	1·447
	000		425	10·794	17			056	1·421
		000	409	10·388			16	050	1·270
0000			400	10·159		18		049	1·244
	00		380	9·651	18			048	1·218
000			372	9·448			17	045	1·142
		00	365	9·271		19		042	1·066
00			348	8·839	19		18	040	1·016
	0		340	8·635	20		19	036	9140
		0	325	8·254		20		035	8886
0			324	8·229	21	21	20	032	8124
1	1		300	7·620		22		030	7617
		1	289	7·340			21	0284	7213
	2		284	7·213	22			028	7109
2			276	7·010			22	0253	6126
	3		259	6·578		23		025	6347
		2	257	6·527	23			024	6093
3			252	6·400	24	24	23	022	5585
	4		238	6·045	25	25	24	020	5078
4			232	5·892	26	26	25	018	4570
		3	229	5·816	27	27	26	016	4062
	5		220	5·588	28	28	27	014	3555
5			212	5·384	29	29		013	3300
		4	204	5·181			28	0122	3100
	6		203	5·156	30	30		012	3046
6			192	4·876	31		29	011	2800
		5	182	4·622	32			0108	2743
	7		180	4·571	33	31	30	010	2539
7			176	4·470	34	32	31	009	2300
	8		165	4·191	35	33	32	008	2031
		6	162	4·114	36	34	33	007	1777
8			160	4·064	37			0068	1727
	9		148	3·759	38		34	006	1523
9		7	144	3·657			35	0056	1422
	10		134	3·403	39	35	36	005	1269
10		8	128	3·251	40			0048	1219
	11		120	3·047	41		37	0044	1118
11			116	2·946	42	36	38	004	1015
		9	114	2·895	43		39	0036	0914
	12		109	2·768	44		40	0032	0813
12			104	2·641	45			0028	0713
		10	102	2·590	46			0024	0610
	13		095	2·412	47			002	0507
13			092	2·336	48			0016	0406
		11	090	2·286	49			0012	0303
	14		083	2·108	50			001	0253
14		12	080	2·032					

*** WIRE TABLES—H.C. COPPER—ANNEALED.**
E.S.C. Standard.

SIZE.	DIAMETER.		SECTIONAL AREA.		WEIGHT. (Minimum.)		RESISTANCE at 60° F. (Maximum.)		CURRENT CAPACITY.	
					Pounds.		Standard Ohms		Ampères at	
S.W.G.	Inch.	M/m.	Square Inch.	Square M/m.	Per 1000 Yards.	Per mile.	Per 1000 Yards.	Per mile.	1000 per Sq. inch.	I.E.E.
47	0.0020	0.0508	0.0000031	0.002027	0.0356	0.0627	7805	13737	0.0031	This Column is compiled according to the Standards fixed by the Institution of Electrical Engineers.
46	0.0024	0.0610	0.0000045	0.002919	0.0513	0.0902	5420	9540	0.0045	
45	0.0028	0.0711	0.0000062	0.003973	0.0698	0.1228	3982	7009	0.0062	
44	0.0032	0.0813	0.0000080	0.005188	0.0911	0.1604	3049	5366	0.0080	
43	0.0036	0.0914	0.0000102	0.006567	0.1153	0.2030	2409	4240	0.0102	
42	0.0040	0.1016	0.0000126	0.008109	0.1424	0.2506	1951	3434	0.0126	
41	0.044	0.1118	0.0000152	0.009810	0.1723	0.3032	1613	2338	0.0152	
40	0.0048	0.1219	0.0000181	0.011674	0.2050	0.3609	1355	2385	0.0181	
39	0.0052	0.1321	0.0000212	0.03701	0.2406	0.4235	1155	2032	0.0212	
38	0.0060	0.1524	0.0000283	0.018241	0.3204	0.5639	867.3	1526	0.283	
37	0.0068	0.1727	0.0000363	0.023430	0.4115	0.7243	675.2	1188	0.0363	
36	0.0076	0.1930	0.0000454	0.029267	0.5140	0.9047	540.5	951.3	0.0454	
35	0.0084	0.2134	0.0000554	0.035752	0.6280	1.105	442.5	778.8	0.0544	
34	0.0092	0.2337	0.0000665	0.042887	0.7533	1.326	368.9	649.2	0.0665	
33	0.0100	0.2540	0.0000785	0.050670	0.8900	1.566	312.2	549.5	0.0785	
32	0.0108	0.2743	0.0000916	0.059102	1.038	1.827	267.7	471.1	0.0916	
31	0.0116	0.2946	0.0001057	0.068181	1.198	2.108	232.0	408.4	0.1057	
30	0.0124	0.3149	0.0001208	0.077910	1.368	2.408	203.1	357.4	0.1207	
29	0.0136	0.3454	0.0001453	0.093722	1.646	2.897	168.8	297.1	0.1453	
28	0.0148	0.3759	0.0001720	0.11099	1.949	3.431	142.5	250.9	0.1720	
27	0.0164	0.4166	0.0002112	0.13628	2.394	4.213	116.1	204.3	0.2112	
26	0.018	0.4572	0.0002545	0.1642	2.883	5.075	96.36	169.6	0.254	
25	0.020	0.5080	0.0003142	0.2027	3.560	6.265	78.05	137.4	0.314	
24	0.022	0.5588	0.0003801	0.2453	4.307	7.581	64.51	113.5	0.380	
23	0.024	0.6096	0.0004524	0.2919	5.126	9.022	54.20	95.40	0.452	
22	0.028	0.7112	0.0006158	0.3973	6.977	12.28	39.82	70.09	0.616	1.7
21	0.032	0.8128	0.0008042	0.5188	9.113	16.04	30.49	53.66	0.804	2.2
20	0.036	0.9144	0.001018	0.6567	11.53	20.30	24.09	42.40	1.018	2.6
19	0.040	1.016	0.001257	0.8109	14.24	25.06	19.51	34.34	1.257	3.2
18	0.048	1.219	0.001810	1.168	20.50	36.09	13.55	23.85	1.810	4.2
17	0.056	1.422	0.002463	1.589	27.91	49.12	9.956	17.52	2.463	5.4
16	0.064	1.626	0.003217	2.075	36.45	64.16	7.622	13.42	3.217	6.8
15	0.072	1.829	0.004072	2.627	46.14	81.20	6.023	10.60	4.072	8.2
14	0.080	2.032	0.005027	3.243	56.96	100.2	4.878	8.586	5.027	9.8
13	0.092	2.337	0.006648	4.289	75.33	132.6	3.689	6.492	6.648	12.4
12	0.104	2.642	0.008495	5.480	96.26	169.4	2.887	5.080	8.495	15.0
11	0.116	2.946	0.01057	6.819	119.8	210.8	2.320	4.084	10.57	18.0
10	0.128	3.251	0.01287	8.303	145.8	256.6	1.906	3.354	12.87	21.0
9	0.144	3.658	0.01629	10.51	184.5	324.8	1.506	2.650	16.29	27.0
8	0.160	4.064	0.02011	12.97	227.8	401.0	1.220	2.146	20.11	31.0
7	0.176	4.470	0.02433	15.70	275.7	485.2	1.008	1.774	24.33	36.0
6	0.192	4.877	0.02895	18.68	328.1	577.4	0.8469	1.491	28.95	42.0
5	0.212	5.385	0.03530	22.77	400.0	704.0	0.6947	1.223	35.30	48
4	0.232	5.893	0.04227	27.27	479.0	843.1	0.5801	1.021	42.27	57
3	0.252	6.401	0.04988	32.18	565.2	994.7	0.4916	0.8653	49.88	64
2	0.276	7.010	0.05983	38.60	677.9	1193	0.4099	0.7213	59.83	75
1	0.300	7.620	0.07069	45.60	801.0	1410	0.3469	0.6105	70.69	85
/0	0.324	8.230	0.08245	53.19	934.2	1644	0.2974	0.5234	82.45	97

* A Table showing data for B H curves will be found on page 844.

WIRE TABLES—H.C. COPPER—ANNEALED.

E.S.C. Standard.

SIZE.	DIAMETER.		SECTIONAL AREA. (Nominal.)		WEIGHT. (Minimum.)		RESISTANCE at 60° F. (Maximum.)		CURRENT CAPACITY.	
					Pounds.		Standard Ohms.		Ampères at	
S.W.G.	Inch.	M/m.	Square Inch.	Square M/m.	Per 1000 Yards.	Per mile	Per 1000 Yards.	Per Mile.	1000 per Sq. Inch.	I.E.
2/0	0·348	8·839	0·09511	61·36	1078	1897	0·2578	0·4537	95·11	
3/0	0·372	9·449	0·1087	70·13	1232	2168	0·2256	0·3971	108·7	
4/0	0·400	10·16	0·1257	81·09	1424	2506	0·1951	0·3434	125·7	
3/25	0·043	1·092	0·00924	0·5965	10·9	19·2	26·53	46·7	0·924	[illegible]
3/23	0·052	1·321	0·001330	0·8580	15·69	27·61	18·43	32·4	1·330	[illegible]
3/22	0·060	1·524	0·001812	1·1680	21·35	37·57	13·54	23·8	1·812	4·
3/20	0·078	1·981	0·002994	1·932	35·30	62·13	8·19	14·4	2·994	[illegible]
3/18	0·103	2·616	0·005323	3·4340	62·74	110·4	4·61	8·11	5·323	10·
7/25	0·060	1·524	0·002162	1·3950	25·35	44·62	11·34	19·96	2·162	4·
7/24	0·066	1·676	0·002620	1·7675	31·35	55·18	9·39	16·52	2·620	5·
7/23	0·072	1·829	0·003114	2·0092	36·50	64·24	7·88	13·87	3·114	6·
7/22	0·084	2·134	0·004258	2·7340	49·69	87·46	5·79	10·19	4·238	8·
7/21½	0·090	2·286	0·004864	3·1381	57·03	100·4	5·04	8·87	4·864	9·
7/21	0·096	2·438	0·005535	3·5710	64·89	114·2	4·43	7·80	5·535	10·
7/20½	0·099	2·515	0·005869	3·7865	69·00	121·45	4·16	7·33	5·869	11·
7/20	0·108	2·743	0·007005	4·495	82·13	144·87	3·50	6·16	7·005	12·
7/19	0·120	3·048	0·008649	5·580	101·40	178·47	2·84	5·00	8·640	15·
7/18	0·144	3·658	0·012460	8·038	146·00	257·0	1·97	3·47	12·46	20·
7/17	0·168	4·267	0·016950	10·936	198·70	349·7	1·45	2·55	16·95	26·
7/16	0·192	4·877	0·022140	14·284	259·50	456·7	1·11	1·95	22·14	33·
7/15	0·216	5·486	0·02803	18·085	328	577	0·8750	1·54	28·03	40·
7/14	0·240	6·096	0·03459	22·32	406	714	0·709	1·24	34·59	47·
7/12	0·312	7·925	0·05845	37·71	686	1210	0·418	0·736	58·45	73·
7/10	0·384	9·754	0·08855	57·13	1039	1833	0·274	0·486	88·55	103·
19/22	0·140	3·556	0·01148	7·406	135	238	2·123	3·63	11·48	19·
19/21	0·160	4·064	0·01500	9·678	176	311	1·625	2·85	15·00	24·
19/20	0·180	4·572	0·01899	12·25	223	393	1·292	2·27	18·99	29·
19/19	0·200	5·080	0·02343	15·12	276	486	1·046	1·84	23·43	34·
19/18	0·240	6·096	0·03375	21·77	397	699	0·727	1·28	33·75	46·
19/17	0·280	7·112	0·04593	29·64	540	950	0·534	0·940	45·93	60·
19/16	0·320	8·128	0·06000	38·71	706	1243	0·409	0·720	60·00	75·
19/15	0·360	9·144	0·07586	48·94	893	1572	0·313	0·550	75·86	91·
19/14	0·400	10·16	0·09372	60·47	1103	1941	0·262	0·461	93·72	108·
19/13	0·460	11·68	0·12385	79·90	1458	2566	0·198	0·335	123·85	136·2
19/12	0·520	13·21	0·15826	102·10	1864	3281	0·149	0·262	158·26	166·4
37/20	0·252	6·401	0·03700	23·8	435	766	0·665	1·169	37·00	50·4
37/18	0·336	8·534	0·0658	42·45	774	1363	0·374	0·656	65·8	80·9
37/16	0·448	11·38	0·1168	75·36	1375	2420	0·210	0·370	116·8	129·6
37/15	0·504	12·80	0·1478	95·35	1740	3062	0·166	0·292	147·8	157·3
37/14	0·560	14·22	0·1824	117·70	2148	3781	0·134	0·236	182·4	187·0
37/13	0·644	16·36	0·250	161·3	2842	5002	0·1016	0·1788	250	238
37/12	0·728	18·49	0·314	202·6	3634	6497	0·0796	0·1402	314	287
61/18	0·432	10·97	0·1104	71·41	1275	2246	0·2220	0·3905	110	122
61/16	0·576	14·63	0·1962	127·8	2269	3993	0·1250	0·2195	196	195
61/14	0·720	18·29	0·3065	197·8	3545	6240	00·797	0·1405	306	281
91/14	0·880	22·35	0·4571	294·5	5289	9309	0·0536	0·0945	457	391
91/13	1·012	25·70	0·600	387·1	6854	12064	0·0421	0·0741	600	490
91/12	1·144	29·06	0·800	516·2	8933	15720	0·0323	0·0569	800	625

GILBERT'S TABLE (Ordinary Catenary).

x=100=half span.

c=Modulus.	d=dip.	s=length of wire.	l=ordinate at insulator.	90°—i°.		
				°	′	″
2000	2·500511	100·041474	2002·500511	87	8	11
1950	2·564593	100·042440	1952·564593	87	3	46
1900	2·632163	100·045727	1902·632163	86	59	8
1850	2·703298	100·047540	1852·703298	86	54	15
1800	2·778421	100·050163	1802·778421	86	49	6
1750	2·857914	100·054318	1752·857914	86	43	40
1700	2·942018	100·057566	1702·942018	86	37	53
1650	3·031204	100·060788	1653·031204	86	31	46
1600	3·125974	100·064421	1603·125974	86	25	16
1550	3·226852	100·068245	1553·226852	86	18	21
1500	3·334558	100·073939	1503·334558	86	10	59
1450	3·449618	100·078929	1453·449618	86	3	6
1400	3·572907	100·084490	1403·572907	85	54	39
1350	3·705344	100·090750	1353·705344	85	45	35
1300	3·847958	100·097440	1303·847958	85	35	45
1250	4·002035	100·105463	1254·002035	85	25	16
1200	4·168981	100·114680	1204·168981	85	13	51
1150	4·350543	100·125801	1154·350543	85	1	26
1100	4·548545	100·137346	1104·548545	84	47	54
1050	4·765440	100·150553	1054·765440	84	33	5
1000	5·004084	100·165906	1005·004084	84	16	48
980	5·106408	100·173025	985·106408	84	9	49
960	5·213007	100·180582	965·213007	84	2	13
940	5·324098	100·188974	945·324098	83	54	58
920	5·440045	100·196191	925·440045	83	47	4
900	5·561266	100·205825	905·561266	83	38	48
880	5·687876	100·214837	885·687876	83	30	11
860	5·820479	100·225255	865·820479	83	21	9
840	5·959364	100·235949	845·959364	83	11	42
820	6·105033	100·247321	826·105038	83	1	47
800	6·258102	100·260296	806·258102	82	51	23
780	6·418938	100·273356	786·418938	82	40	28
760	6·588360	100·288153	66·588360	82	28	57
740	6·767004	100·304328	746·767004	82	16	50
720	6·955577	100·321527	726·955577	82	4	3
700	7·154926	100·339869	707·154926	81	50	33
680	7·366193	100·360765	687·366193	81	36	15
660	7·590181	100·382517	667·590181	81	21	6
640	7·828368	100·407143	647·828368	81	5	1
620	8·081923	100·433570	628·081923	80	47	54
600	8·352608	100·463404	608·352608	80	29	40
580	8·642033	100·495985	588·642033	80	10	11
560	8·952299	100·532176	568·952299	79	49	27
540	9·283888	100·562366	549·283888	79	27	2
520	9·645021	100·617335	529·645021	79	2	56
500	10·033315	100·667683	510·033315	78	36	59
480	10·454508	100·725490	490·454508	78	8	55
460	10·912412	100·789382	470·912412	77	38	28
440	11·412622	100·863052	451·412622	77	5	23
420	11·961025	100·947150	431·961025	76	29	6
400	12·565207	101·044792	412·565207	75	49	22
380	13·233994	101·158163	393·233994	75	5	35
360	13·978365	101·290757	373·978365	74	17	7
340	14·812141	101·447796	354·812141	73	32	10
320	15·752501	101·635337	335·752501	72	22	46
300	16·821529	101·862069	316·821529	71	14	44
280	18·047685	102·139232	298·047685	69	57	31
260	19·468993	102·483745	279·468993	68	29	13
240	21·126437	102·893226	261·126437	66	47	38
220	23·118850	103·473548	243·118850	64	48	38
200	25·525175	104·219022	225·525175	62	28	34
180	28·559946	105·343499	208·559946	59	39	43
160	32·280531	106·638654	192·280531	56	19	0
140	37·258541	108·722538	177·258541	52	10	2
120	44·134402	111·982596	164·134402	46	58	48
100	54·308027	117·520071	154·308027	40	23	42
95	57·674415	119·517684	152·674415	38	28	45
90	61·511583	121·884206	151·511583	36	26	34
85	65·852160	124·624934	150·852160	34	17	44
80	74·073875	128·153485	151·073875	31	58	28
75	77·147407	132·377616	152·147407	29	32	4
70	84·433443	137·657866	154·433443	26	57	10

TABLE.

The figures in this Table apply to situations where the maximum temperature of the air does not exceed 100° F. (37·7° C.). A margin in the maximum possible temperature of the cables has been allowed to provide for contingencies. The figures in columns 3, 3*a*, 4, and 4*a* have been supplied by the National Physical Laboratory to comply with Rule 36.

Gauge. Number of wires and gauge in S.W.G. or inches.	*Section.* Nominal sectional area of conductors.	*Rubber Insulated Cables.* *Current.* Maximum current permissible.	*Rubber Insulated Cables.* *Volts drop.* Approximate total length in circuit (lead and return) for 1-volt drop (Col. 3).	*Paper or Fibre Insulated Cables.* *Current.* Maximum current permissible.	*Paper or Fibre Insulated Cables.* *Volts drop.* Approximate total length in circuit (lead and return) for 1-volt drop (Col. 4).	*Minimum Insulation Resistance of one mile in megohms at 60° F.* *Vulcanised Rubber.* Up to 250 volts.	*Minimum Insulation Resistance of one mile in megohms at 60° F.* *Vulcanised Rubber.* Up to 650 volts.	*Minimum Insulation Resistance of one mile in megohms at 60° F.* *Paper or Fibre.* (Class B.)	*Resistance.* Conductor resistance in standard ohms per 1,000 yards.	*Minimum Radial Thickness.* *Vulcanised Rubber.* Up to 250 volts.	*Minimum Radial Thickness.* *Vulcanised Rubber.* Up to 650 volts.	*Minimum Radial Thickness.* *Paper or Fibre.* (Class B.)	*Minimum Radial Thickness.* *Lead Sheath.*	*Gauge.* Number of wires and gauge in S.W.G. or inches.
1.	**2.**	**3.***	**3a.**	**4.***	**4a.**	**5.**	**6.**	**7**	**8.**	**9.**	**10.**	**11.**	**12.**	**13.**
	Sq. Inches.	Amperes.	Yards.	Amperes.	Yards.	Megohms.	Megohms.	Megohms.	Ohms.	Inches.	Inches.	Inches.	Inches.	
Fittings Wires. 3/25	0·0009	3·7	10	3·7	10	1,250	4,500	For conductors smaller than 7/18, the insulation resistance must not be less than 140 megohms.	26·01	0·034	0·062	—	—	3/25 Fittings Wires.
3/24	0·0011	4·5	10	4·5	10	1,250	4,500		21·50	0·034	0·062	—	—	3/24
3/23	0·0013	5·3	10	5·3	10	1,250	4,500		18·07	0·035	0·062	—	—	3/23
1/18	0·0018	7·2	10	0·2	10	2,000	5,000		13·29	0·035	0·062	—	—	1/18
3/22	0·0018	7·2	10	7·2	10	1,250	4,500		13·27	0·036	0·062	—	—	3/22
7/25	0·0022	8·6	10	8·6	10	1,250	4,500		11·12	0·036	0·062	—	—	7/25
3/21	0·0024	9·5	10	9·5	10	1,250	4,500		10·16	0·038	0·062	—	—	3/21
1/17	0·0025	9·8	10	9·8	10	2,000	5,000		9·761	0·036	0·062	—	—	1/17
7/24	0·0026	10·4	10	10·4	10	1,250	4,500		9·19	0·037	0·062	—	—	7/24
3/20	0·0030	12·0	10	12·0	10	1,250	4,500		8·0	0·038	0·062	—	—	3/20
7/23	0·0031	12·4	10	12·4	10	1,250	4,500		7·72	0·037	0·062	—	—	7/23
1/16	0·0032	12·9	10	12·9	10	2,000	5,000		7·47	0·036	0·062	—	—	1/16
3/19	0·0037	14·8	10	14·8	10	1,250	4,500		6·504	0·039	0·062	—	—	3/19
1/15	0·0041	16·3	10	16·3	10	1,250	4,500		5·905	0·037	0·062	—	—	1/15
7/22	0·0042	17·0	10	17·0	10	1,250	4,500		5·672	0·038	0·062	—	—	7/22
1/14	0·0050	19·0	10	20·1	10	1,250	4,500		4·783	0·038	0·062	—	—	1/14
3/18	0·0053	20·0	11	21·2	10	1,250	4,500		4·516	0·040	0·062	—	—	3/18
7/21	0·0055	21·0	11	22·1	10	1,250	4,500		4·343	0·040	0·062	—	—	7/21
7/20	[illegible]	24·0	12	[illegible]	10	900	4,000		[illegible]	0·041	0·062	—	—	7/20
7/18	0·0125	34·0	14	[illegible]	[illegible]	[illegible]	[illegible]	140	1·930	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

7/17	0·017	40·0	17	67·0	10	900	4,000	140	1·418	0·047	0·062	0·080	0·060	7/17
19/20	0·019	43·0	18	69·0	11	750	3,500	140	1·266	0·048	0·062	0·080	0·060	19/20
7/16	0·022	46·0	19	75·0	11	900	3,500	140	1·086	0·049	0·62	0·080	0·060	7/16
19/19	0·023	47·0	19	76·0	12	750	3,500	140	1·0260	0·050	0·062	0·080	0·060	19/19
7/·068″	0·025	50·0	20	81·0	12	750	3,500	140	0·9618	0·050	0·062	0·080	0·060	7/·068″
7/15	0·028	53·0	21	86·0	12	750	3,500	140	0·8578	0·052	0·062	0·080	0·060	7/15
19/18	0·034	59·0	23	96·0	13	750	3,000	120	0·7125	0·054	0·062	0·080	0·060	19/18
7/14	0·035	60·0	23	97·0	13	750	3,500	120	0·6949	0·054	0·062	0·080	0·060	7/14
19/17	0·046	70·0	26	114·0	15	750	3,000	120	0·5234	0·058	0·062	0·080	0·060	19/17
7/·097″	0·050	74·0	27	120·0	16	750	3,500	120	0·4727	0·059	0·062	0·080	0·060	7/·097″
19/·058″	0·050	74·0	27	120·0	16	750	3,000	120	0·4880	0·059	0·062	0·080	0·060	19/·058″
19/16	0·060	83·0	29	135·0	17	750	3,000	110	0·4007	0·062	0·066	0·080	0·070	19/16
19/·072″	0·075	97·0	31	157·0	18	600	3,000	110	0·3167	0·060	0·066	0·080	0·070	19/·072″
19/14	0·094	113·0	33	183·0	19	600	3,000	100	0·2565	0·070	0·071	0·090	0·070	19/14
19/·083″	0·100	118·0	34	191·0	20	600	3,000	100	0·2383	0·071	0·071	0·090	0·070	19/·083″
37/16	0·117	130·0	36	210·0	21	600	3,000	90	0·2059	0·075	0·076	0·090	0·070	37/16
19/·092″	0·125	134·0	37	219·0	21	600	3,000	90	0·1940	0·076	0·076	0·090	0·070	19/·092″
37/·072″	0·150	152·0	39	246·0	23	600	3,000	90	0·1627	0·080	0·080	0·090	0·080	37/·072″
19/·101″	0·150	152·0	39	246·0	23	600	3,000	90	0·1610	0·081	0·080	0·090	0·080	19/·101″
37/14	0·182	172·0	42	275·0	24	600	2,500	90	0·1318	0·086	0·087	0·090	0·080	37/16
37/·083″	0·200	184·0	43	296·0	25	600	2,500	90	0·1224	0·087	0·087	0·090	0·080	37/·083″
37/·092″	0·250	214·0	47	343·0	27	600	2,500	80	0·0997	0·094	0·094	0·100	0·090	37/·092″
37/·104″	0·300	240·0	50	385·0	29	600	2,500	80	0·0780	0·103	0·101	0·100	0·090	37/·104″
37/·112″	0·350	264·0	53	425·0	31	600	2,500	80	0·0672	0·107	0·107	0·100	0·090	37/·112″
61/·092″	0·400	288·0	55	464·0	32	600	2,500	80	0·0605	0·113	0·113	0·100	0·100	61/·092″
61/·097″	0·450	310·0	58	502·0	34	600	2,500	80	0·0544	0·121	0·118	0·100	0·100	61/·097″
61/·104″	0·500	332·0	60	540·0	35	600	2,500	80	0·0473	0·121	0·121	0·100	0·100	61/·104″
61/·108″	0·550	357·0	61	583·0	36	600	2,500	80	0·0439	0·125	0·125	0·110	0·110	61/·108″
61/·112″	0·600	384·0	62	624·0	36	600	2,500	80	0·0408	0·125	0·125	0·110	0·110	61/·112″
61/·118″	0·650	410·0	63	662·0	37	600	2,500	80	0·0368	0·129	0·129	0·110	0·110	61/·118″
91/·098″	0·700	434·0	64	700·0	38	600	2,500	70	0·0357	0·129	0·129	0·110	0·110	91/·098″
91/·101″	0·750	461·0	65	738·0	38	600	2,500	70	0·0336	0·131	0·131	0·110	0·110	91/·101″
91/·108″	0·800	488·0	65	776·0	39	600	2,500	70	0·0294	0·133	0·133	0·120	0·120	91/·108″
91/·112″	0·900	540·0	66	855·0	39	600	2,500	70	0·0273	0·137	0·137	0·120	0·120	91/·112″
91/·118″	1·000	595·0	67	932·0	40	600	2,500	70	0·0246	0·141	0·141	0·130	0·120	91/·118″
127/·101″	1·000	595·0	67	932·0	40	600	2,500	70	0·0241	0·141	0·141	0·130	0·120	127/·101″

* N.B.—It must not be assumed that this current is always permissible, especially for lighting circuits where the determining factor is the drop in volts.

GILBERT'S TABLE.

Notes on the Use of the Table as given on page 841.

Let the distance between the points of support be 2,000 ft. Then x, the half-span, is 1,000 ft. In the table x is represented by 100; therefore every unit in the table represents 10 ft.

Let the required sag be 30 ft., or 3 units of dip. The nearest to this in column 2 is $d = 3{\cdot}031$.

In column 5 we find that the angle which the catenary will make with the vertical through the point of support is $86^{\circ}\ 31'\ 46''$.

In column 3 we find that the actual length of the catenary will be 100·060788 units, or 1000·61 ft.

In column 1 we find that the modulus c is 1,650. This modulus multiplied by the weight per unit length gives the tension at the lowest (mid-) point.

Thus if the wire forming the catenary weighs 100 lbs. per 1,000 yards, or 1-30 lb. per foot, the weight per unit of the table is $\frac{1}{3}$ lb., and the tension at the lowest point will be $1{,}650 \times \frac{1}{3}$, or 550 lbs., due to weight of wire alone.

The tension at the point of suspension is found by adding to this mid-point tension the product of the sag in feet into the weight of wire per foot; that is, in this case, by adding 1 lb.

DATA FOR *B-H* CURVES *(see page 839).*

Average First Quality American Metal.

(Sheldon.)

H	Ampere turns per cm. length.	Ampere turns per inch length.	Cast Iron.		Cast Steel.		Wrought Iron.		Sheet Metal.	
			B Kilo-gausses.	Kilomax-wells per sq. in.	*B* Kilo-gausses.	Kilomax-wells per sq. in.	*B* Kilo-gausses.	Kilomax-wells per sq. in.	*B* Kilo-gausses.	Kilomax-wells per sq. in.
10	7·95	20·2	4·3	27·7	11·5	74·2	13.0	83·8	14·3	92·2
20	15·90	40·4	5·7	36·8	13·8	89·0	14·7	94·8	15·6	100·7
30	23·85	60·6	6·5	41·9	14·9	96·1	15·3	98·6	16·2	104·5
40	31·80	80·8	7·1	45·8	15·5	100·0	15·7	101·2	16·6	107·1
50	39·75	101·0	7·6	49·0	16·0	103·2	16·0	103·2	16·9	109·0
60	47·70	121·2	8·0	51·6	16·5	106·5	16·3	105·2	17·3	111·6
70	55·65	141·4	8·4	53·2	16·9	109·0	16·5	106·5	17·5	112·9
80	63·65	161·6	8·7	56·1	17·2	111·0	16·7	107·8	17·7	114·1
90	71·60	181·8	9·0	58·0	17·4	112·2	16·9	109·0	18·0	116·1
100	79·50	202·0	9·4	60·6	17·7	114·1	17·2	110·9	18·2	117·3
150	119·25	303·0	10·6	68·3	18·5	119·2	18·0	116·1	19·0	122·7
200	159·0	404·0	11·7	75·5	19·2	123·9	18·7	120·8	19·6	126·5
250	198·8	505·0	12·4	80·0	19·7	127·1	19·2	123·9	20·2	130·2
300	238·5	606·0	13·2	85·1	20·1	129·6	19·7	127·1	20·7	133·5

$H = 1{\cdot}257$ ampere turns per cm. $= {\cdot}495$ ampere turns per inch

WEIGHTS AND MEASURES

AVOIRDUPOIS WEIGHT.

drachms.	oz.	lbs.	qrs.	cwts.	ton.	grammes.
1	= ·0625	= ·0039	= ·000139	= ·000035	= ·00000174	= 1·771846
16	= 1	= ·0625	= ·00223	= ·000558	= ·000028	= 28·34954
256	= 16	= 1	= ·0357	= ·00893	= ·000447	= 453·59
7168	= 448	= 28	= 1	= ·25	= ·0125	= 12,700
28672	= 1792	= 112	= 4	= 1	= ·05	= 50,802
573440	= 35840	= 2240	= 80	= 20	= 1	= 1,016,048

TROY WEIGHT.

grains.	dwts.	oz.	lb.	grammes.
1 =	·04167 =	·00208 =	·0001736 =	·0648
24	= 1	= ·05	= ·004167	= 1·555
480	= 20	= 1	= ·0833	= 31·1035
5760	= 240	= 12	= 1	= 373·242

7000 grains troy = 1 lb. avoirdupois.
175 lbs. troy = 144 lbs. avoirdupois.
lbs. avoirdupois × 1·2153 = lbs. troy.
lbs. troy × ·82286 = lbs. avoirdupois.

LONG MEASURE.

ins.	feet.	yards.	fath.	poles.	furl.	mile.	metres.
1	= ·083	= ·02778	= ·0139	= ·005	= ·000126	= ·0000158 =	·0254
12	= 1	= ·333	= ·1667	= ·0606	= ·00151	= ·0001894 =	·3048
36	= 3	= 1	= ·5	= ·182	= ·00454	= ·000568 =	·9144
72	= 6	= 2	= 1	= ·364	= ·0091	= ·001136 =	1·8287
198	= 16½	= 5½	= 2¾	= 1	= ·025	= ·003125 =	5·0291
7920	= 660	= 220	= 110	= 40	= 1	= ·125	= 201·16
63360	= 5280	= 1760	= 880	= 320	= 8	= 1	= 1609·315

MEASURE OF CAPACITY

pints.	gall.	peck.	bushel.	quarter.	wey.	last.	cub. ft.	litres.
1	= ·125	= ·0625	= ·01562	= ·00195	= ·00039	= ·000195 =	·02 =	·5676
8	= 1	= ·5	= ·125	= ·0156	= ·00312	= ·00156 =	·1604 =	4·543
16	= 2	= 1	= ·25	= ·03125	= ·00625	= ·00312 =	·3208 =	9·082
64	= 8	= 4	= 1	= ·125	= ·025	= ·0125 =	1·283 =	36·32816
512	= 64	= 32	= 8	= 1	= ·2	= ·1	= 10·264	= 290·625
2560	= 320	= 160	= 40	= 5	= 1	= ·5	= 51·319	= 1453·126
5120	= 640	= 320	= 80	= 10	= 2	= 1	= 102·64	= 2906·25

1 gallon in wine, ale, or dry measure
= 277¼ cubic inches = ·16 cubic foot
= 10 lbs. of distilled water =
Cube feet × 6·2355 = gallons.
Cube ins. × ·003607 = gallons.
1 bushel = 2218·19 cube inches = 1·28 cube foot.
Cube feet = ·78 = bushels.
Cube ins. × ·00045 = bushels.

SQUARE OR SURFACE MEASURE.

144 square inches = 1 square foot.
9 square feet = 1 square yard.
30¼ square yards = 1 square rod or perch.
40 square rods = 1 rood.
4 roods = 1 acre (4,840 square yards).
640 acres = 1 square mile (3,097,600 square yards).

METRIC SYSTEM OF WEIGHTS AND MEASURES.

The Metric System is based upon the estimated length of the fourth part of a terrestrial meridian. The ten-millionth part of this arc is called a *Metre*, and is the unit of length. The cube of the tenth part of the metre was adopted as the unit of capacity, and denominated a *Litre*. The weight of a litre of distilled water at its greatest density was called a *Kilogramme*, of which the thousandth part, or *Gramme*, was adopted as the unit of weight. The multiples of these, proceeding in decimal progression, are distinguished by the employment of the prefixes *deca, hecto, kilo*, and *myria*, and the subdivisions by *deci, centi*, and *milli*. The units in general use are as follows :—

MEASURES OF LENGTH (UNIT METRE).

Equal to	Metre.	Inches.	Feet.	Yards.	Miles.
Millimetre	0·001 ...	0·039 ...	0·003 ...	0·001 ...	0·000
Centimetre	0·010 ...	0·393 ...	0·032 ...	0·010 ...	0·000
Metre	1·000 ...	39·370 ...	3·280 ...	1·093 ...	0·000
Kilometre	1000·000 ...	39370·790 ...	3280·899 ...	1093·633 ...	0·621

CUBIC, OR MEASURES OF CAPACITY (UNIT LITRE).

Equal to	Cubic inches.	Cubic feet.	Pints.	Gallons.
Cubic Centimetre	0·061 ...	0·000 ...	0·001 ...	0·000
Litre, or cubic decimetre ...	61·027 ...	0·035 ...	1·760 ...	0·220
Cubic Metre	61027·051 ...	35·316 ...	1760·773 ...	220·096

MEASURES OF WEIGHT (UNIT GRAMME).

Equal to	Grains.	Avoirdupois lb.	Cwt. = 112lb.	Tons = 20 cwt
Milligramme ...	0·015 ...	0·000 ...	0·000 ...	0·0000
Gramme ...	15·432 ...	0·002 ...	0·000 ...	0·0000
Kilogramme ...	15432·348 ...	2·204 ...	0·019 ...	0·0009
Tonne = 1,000 kilogs.	...	2204·000 ...	19·678 ...	0·9839

SQUARE, OR SURFACE MEASURE.

Equal to	Square feet.	Square yards.
Square Metre	10·7643	1·196

Hectare = 10,000 sq. met. = 11,960 sq. yds. = 2·47 acres.

The Metric System of Weights and Measures, which, as plainly demonstrated in the preceding pages, is logically symmetrical, now forms the usual standard in the following countries :—

*Argentine Republic.	Egypt.	*Peru.
Austro-Hungary.	France.	Portugal.
Belgium.	German Empire.	†Roumania.
*Bolivia.	†Greece.	Servia.
*Brazil.	Holland.	*Spain.
*Chile.	Italy.	Sweden.
*Colombia.	*Mexico.	
Denmark.	Norway.	

The following countries have not adopted the Metric System :—

Canada.—The legal Weights and Measures are the Imperial yard, Imperial pound avoirdupois, Imperial gallon, and the Imperial bushel. By Act 42 Vict., cap. 16, the British hundredweight of 112 pounds and the ton of 2,240 pounds were abolished, and the hundredweight was declared to be 100 pounds, and the ton 2,000 pounds avoirdupois as in United States, but sometimes contracts stipulate for the British weights.

China.

Weights—10 Ch'ien ... = 1 Liang (Tael) = 1·333 oz. avoirdupois or 37·78 grammes

16 Liang ... = 1 Kin (Catty) = 1·333 lbs. avoirdupois or 604·53 grammes.

100 Chin ... = 1 Tan (Picul) = 133·333 lbs. avoirdupois or 60·453 kilogrammes.

4 ozs. = 3 taels; 1 lb. = $\frac{3}{4}$ catty or 12 taels; 1 cwt. = 84 catties; 1 ton = 16 piculs 80 catties.

* Old Spanish measures also occasionally used are :—

Onza	=	1·014 ounce avoirdupois.
Libra	=	1·014 lb. avoirdupois.
Quintal	=	101·44 lb. avoirdupois.
Arroba (of 25 libras)	=	25·36 lb. avoirdupois.
Arroba of Wine	=	6·70 Imperial gallons.
Gallon	=	0·74 Imperial gallon.
Vara	=	0·927 yard.
Square Vara	=	0·859 square yard.

† Turkish measures are also in use :—

Oke of 410 drams	=	2·8283 lbs. avoirdupois.
Almud	=	1·151 Imperial gallons.
Kileh	=	0·9120 Imperial gallon.
44 okes = 1 Cantar	=	124·3616 lbs. avoirdupois.
39·6263 okes	=	1 cwt.
180 okes = 1 Tcheke	=	509·095 pounds.
1 kileh = 20 okes	=	0·36 Imperial quarter.
816 kilehs	=	100 Imperial quarters.

Capacity—10 Ko ... ... = 1 Sheng (pint) = 1·031 litre
10 Sheng... ... = 1 Tou (peck) = 10·31 litre (holding from 6½ to 10 Kin of rice and measuring from 1·13 to 1·63 gallon)

Commodities, even liquids, such as oil, spirits, etc., are commonly bought and sold by weight.

Length—10 Fen ... ... = 1 Ts'un (inch)
10 Ts'un ... ... = 1 Chi'h (foot) = 14·1 English inches by treaty
10 Chi'h ... ... = 1 Chang = 11 ft. 9 in. (141 in. by treaty)
1 Li ... ... = ⅓ English mile (about)

The mow, the unit of measurement, is almost exactly one-sixth of an acre.

In the tariff settled by treaty between Great Britain and China, the Chi'h of 14 $\frac{1}{10}$ English inches has been adopted as the legal standard. The standards of weight and length vary all over the Empire, the Chi'h ranging from 9 to 16 English inches, and the Chang (= 10 Chi'h) in proportion; at the treaty ports, the use of foreign treaty standard of Chi'h and Chang is common.

In October, 1907, a decree for uniform weights and measures was issued, making the K'up'ing or Treasury Scale the standard weight. The K'up'ing tael or ounce weighs 575·64 grains. The Haikwan tael weighs 581·47 grains.

INDIA.—The Maund of Bengal,

40 Seers ...	... =	$82\frac{2}{7}$ lbs. avoirdupois
The Maund of Madras	... =	25 ,, ,, (nearly)
,, Tola	... =	180 grains troy
,, Guz of Bengal ...	... =	36 inches

An Act to provide for the adoption of an uniform system of weights and measures was passed in 1871. The Act orders: "Art. 2. The primary standard of weight shall be called a seer, and shall be a weight of metal in the possession of the Government of India, equal, when weighed in a vacuum, to the weight known in France as the kilogramme = 2·205 lbs. avoirdupois." "Art. 3. The units of weight and measures of capacity shall be, for weights, the said seer; for measures of capacity, a measure containing one such seer of water at its maximum density, weighed in a vacuum. Unless it be otherwise ordered, the sub-divisions of all such weights and measures of capacity shall be expressed in decimal parts." This Act, however, has never been in operation.

MR. TSIANG-TSENG-YI, DIRECTOR-GENERAL OF CHINESE TELEGRAPH ADMINISTRATION.

(For whose Biographical Notice see page 896.)

[*To face page* 848.

JAPAN.—The Mommé	=	2·11 drams or 2·41 dwts. or 120 mommé = 1 lb. avoirdupois
The Kin (Catty) = 160 mommé	=	1·322 lb. avoirdupois (0·266 mommé = 1· gramme) or 1·60 lbs. troy
,, Picul (100 kin)	=	132·27 lbs.
,, Kwan = 1,000 mommé...	=	8·261 lbs. avoirdupois or 10·04 lbs. troy
,, Shaku	=	·994 foot (3·3 shaku = 1 metre)
,, Kujira Shaku	=	1·242 feet
,, Sün	=	1·193 inches
,, Ken = 6 Shaku	=	5·965 feet
,, Jo = 10 Shaku	=	9·942 feet
,, Chô = 60 Ken	=	357·916 feet, or about $\frac{1}{15}$ mile
,, Ri = 36 Chô	=	2·44 miles
,, Ri (marine)	=	1·15 mile
,, Ri (square)	=	5·9552 square miles
,, Chô = 10 tan	=	2·45 acres
,, Koku, Liquid = 10 To = 100 Sho	=	39·7033 gallons
,, Koku, Dry	=	4·9629 bushels
,, Koku (capacity of vessel)	=	$\frac{1}{10}$ ton
,, To, Liquid	=	3·9703 gallons
,, To, Dry	=	1·9851 peck

RUSSIA.—1 Verst (500 sajènes)...	=	3,500 feet, or two-thirds of a statute mile
1 Sajène (3 arshins)... ...	=	7 feet
1 Arshin (16 vershok) ...	=	28 inches
1 Square Verst	=	0·43941 square mile
1 Dessiatine	=	2·69972 acres
1 Pound (96 zolotniks = 32 lot)	=	$\frac{9}{10}$ of a pound or 14·4 ounces
1 Pood (40 pounds)	=	36·113 lbs. = 0·32244 cwt. or 100 poods = 1·6121 tons. Baltic Freight is usually quoted per ton of 62 poods
1 Vedro (8 shtoffs)	=	$2\frac{3}{4}$ Imperial gallons
1 Chetvert (8 chetveriks) ...	=	5·77 Imperial bushels or 46·2 gals.

UNITED STATES.—British weights and measures are usually employed, but the old Winchester gallon and bushel are used instead of the new or Imperial standards. Different States have a legal standard for bushels of certain articles, such as grain and potatoes, varying from 60 lbs. for wheat to 32 for oats.

Wine gallon	=	0·83333 gallon
Ale gallon	=	1·01695 ,,
Bushel	=	0·9692 Imperial bushel

Instead of the British cwt. a cental, of 100 lbs., is used. 1 ton = 2,000 lbs., except coal, which is usually 2,240 lbs. wholesale.

NAUTICAL MEASURES

(From "Lloyd's Calendar," by permission of the Committee of Lloyd's.)

12 inches	= 1 foot	6 feet	= 1 fathom
3 feet	= 1 yard	3 nautical miles ...	= 1 league

Sea or Nautical Mile = one-sixtieth of a degree of latitude, and varies from 6,046 ft. on the Equator to 6,092 ft. in lat. 60°.

Nautical Mile for speed trials, generally called the Admiralty Measured Mile ... { 6,080 feet; 1·151 statute miles; 1,853 metres }

Cable's length = the tenth of a nautical mile; or approximately, 100 fathoms or 200 yards.

A Knot = a nautical mile an hour, is a measure of speed, but is not infrequently, though erroneously, used as synonymous with a nautical mile.

Length of European Measures of Distances compared with the Nautical Mile of 6,080 feet.

	Length in Nautical Miles.		Length in Nautical Miles.
Nautical Mile	1·000	German Ruthen	4·064
British Statute Land Mile	0·868	Italian Mile	1·000
Austrian Mile	4·094	Norwegian Mile	6·097
Danish Mile	4·064	Russian Verst	0·576
French Kilometre	0·539	Swedish Mile	5·769
German Geographical Mile	4·000		

DISTANCE OF HORIZON.

The distance of the horizon—*i.e.*, the greatest distance at which the surface of the sea is visible varies somewhat with refraction in the atmosphere, but is, on clear days, approximately as below :—

Elevation Feet.	Miles.	Elevation Feet.	Miles.	Elevation Feet.	Miles.
5	2·96	50	9·35	500	29·58
10	4·18	100	13·23	1000	33·40
20	5·92	200	18·72	5280	96·18
		300	22·91		

LENGTH OF A DEGREE IN LATITUDE AND LONGITUDE

Lat.	Degree of Longitude.		Degree of Latitude.		Lat.	Degree of Longitude.		Degree of Latitude.	
°	Stat. Miles.	Naut. Miles.	Stat. Miles.	Naut Miles.	°	Stat. Miles.	Naut. Miles.	Stat. Miles.	Naut. Miles.
0	69·160	60·000	68·698	59·600	45	48·986	42·498	69·044	59·899
2	·119	59·964	·699	·601	47	47·251	40·993	·068	·920
4	68·992	·855	·702	·603	49	45·459	39·439	·092	·941
6	·783	·673	·706	·607	51	43·611	37·835	·116	·962
8	·491	·419	·712	·612	53	41·710	36·186	·140	·982
10	·116	·093	·719	·618	55	39·758	34·491	·162	60·002
12	67·659	58·697	·728	·625	57	37·756	32·755	·184	·022
14	·120	·229	·738	·634	59	35·707	30·979	·206	·041
16	66·499	57·690	·750	·645	61	33·615	29·164	·228	·059
18	65·797	·081	·764	·657	63	31·481	27·311	·248	·077
20	·015	56·404	·779	·669	65	29·308	25·425	·268	·094
22	64·154	55·657	·795	·683	67	27·100	23·509	·286	·110
24	63·216	54·843	·813	·699	69	24·857	21·564	·302	·124
26	62·201	53·962	·831	·715	71	22·582	19·593	·318	·137
28	61·110	·016	·850	·731	73	20·282	17·597	·333	·149
30	59·944	52·005	·870	·749	75	17·956	15·578	·345	·161
32	58·706	50·931	·892	·767	77	15·607	13·539	·357	·171
34	57·396	49·794	·914	·786	79	13·238	11·484	·367	·179
36	56·016	48·597	·936	·806	81	10·853	9·417	·375	·186
38	54·568	47·340	·959	·826	83	8·456	7·338	·381	·192
40	53·053	46·026	·983	·846	85	6·048	5·248	·387	·196
42	51·473	44·656	69·007	·866	87	3·632	3·151	·390	·199
44	49·830	43·231	·013	·888	89	1·211	1·050	·392	·201

SPECIFICATION OF THE BEAUFORT SCALE WITH PROBABLE EQUIVALENTS OF THE NUMBERS OF THE SCALE.

Beaufort Number.	Admiral Beaufort's General Description of Wind.	Description of Wind.	Mode of Estimating aboard Sailing Vessels	Specification of Beaufort Scale.		Mean wind force in lb. per square ft. at standard density. ($P = \cdot 0105 B^3$.)	Corresponding Pressure in Centibars (10^4 dynes per cm.^{2})	Equivalent velocity in miles per hour.‡	Limits of Velocities.§				Beaufort Number.
				For Coast Use, based on Observations made at Scilly, Yarmouth and Holyhead.	For Use on Land, based on Observations made at Land Stations.				Statute Miles per Hour.	Nautical Miles per Hour.	Metres per Second.	Feet per Second.	
0	Calm	.. .. ..	.. ..	Calm	Calm; smoke rises vertically.	0	0	0	Less than 1	Less than 1	Less than 0·3	Less than 2	0
1	Light air ..			Fishing smack * just has steerage way.	Direction of wind shown by smoke drift, but not by wind vanes.	·01	·000	2	1–3	1–3	0·3–1·5	2–5	1
2	Slight breeze	Light breeze	Sufficient wind for working ship.	Wind fills the sails of smacks, which then move at about 1–2 miles per hour.	Wind felt on face; leaves rustle; ordinary vane moved by wind.	·08	·004	5	4–7	4–6	1·6–3·3	6–11	2
3	Gentle breeze			Smacks begin to careen, and travel about 3–4 miles per hour.	Leaves and small twigs in constant motion; wind extends light flag.	·28	·013	10	8–12	7–10	3·4–5·4	12–18	3
4	Moderate breeze	Moderate breeze	Forces most advantageous for sailing with leading wind and all sail drawing.	Good working breeze; smacks carry all canvas, with good list.	Raises dust and loose paper; small branches are moved.	·67	·031	15	13–18	11–16	5·5–8·0	19–27	4
5	Fresh breeze			Smacks shorten sail.	Small trees in leaf begin to sway; crested wavelets form on inland waters.	1·31	·060	21	19–24	17–21	8·1–10·7	28–36	5

6	Strong breeze	Strong wind	Reduction of sail necessary with leading wind.	Smacks have double reef in main sail. Care required when fishing.	Large branches in motion; whistling heard in telegraph wires; umbrellas used with difficulty.	2·3	·103	27	25–31	22–27	10·8–13·8	37–46	6
7	Moderate gale (*High wind*)†			Smacks remain in harbour, and those at sea lie to.	Whole trees in motion; inconvenience felt when walking against wind.	3·6	·164	35	32–38	28–33	13·9–17·1	47–56	7
8	Fresh gale .. (*Gale*)†	Gale forces	Considerable reduction of sail necessary even with wind quartering.	All smacks make for harbour, if near.	Breaks twigs off trees: generally impedes progress.	5·4	·245	42	39–46	34–40	17·2–20·7	57–68	8
9	Strong gale ..			.. ..	Slight structural damage occurs (chimney pots and slates removed).	7·7	·348	50	47–54	41–47	20·8–24·4	69–80	9
10	Whole gale ..	Storm forces	Close reefed sail running, or hove to under storm sail.	.. ..	Seldom experienced inland; trees uprooted; considerable structural damage occurs.	10·5	·478	59	55–63	48–55	24·5–28·4	81–93	10
11	Storm			.. ..	Very rarely experienced; accompanied by widespread damage.	14·0	·636	68	64–75	56–65	28·5–33·5	94–110	11
12	Hurricane ..	Hurricane	No sail can stand even when running	.. ..	.. ..	Above 17·0	·826	Above 75	Above 75	Above 65	33·6 or above	Above 110	12

* The fishing smack in this column may be taken as representing a trawler of average type and trim. For larger or smaller boats and for special circumstances allowance must be made.

† It has recently been decided that for statistical purposes winds of force less than 8 shall not be counted as gales, and to avoid the ambiguity implied by the use of the term "moderate gale" for force 7 the Beaufort description has been modified for use in connection with the daily weather service by the substitution of the descriptions in italics for forces 7 and 8.

‡ For converting estimates on the Beaufort scale into miles per hour (anemometer factor, 2·2).

§ For finding the Beaufort number corresponding with a recorded velocity.

Meteorological Office,
South Kensington, London, S.W.
January, 1914.

THERMOMETRICAL AND BAROMETRICAL TABLE.

THERMOMETERS.

Réaumur.	Centigrade.	Fahrenheit.	
80°	100°	212°	WATER BOILS (when the bar. is at 30 inch = 760 mm.)
76	95	203	
72	90	194	
68	85	185	
64	80	176	
62·7	78·3	173	Alcohol boils (when the bar. is at 30 inch = 760 mm.)
60	75	167	
56	70	158	
52	65	149	
48	60	140	
44	55	131	
43	53	127	Tallow melts.
40	50	122	
36	45	113	
32	40	104	
30·2	37·8	100	Fever heat commences.
29·3	36·7	98	Blood heat.
28	35	95	
24	30	86	
20	25	77	Summer heat.
19	24	76	
16	20	68	
12	15	59	Temperate.
8	10	50	Temperature of spring water.
4	5	41	
0	0	32	WATER FREEZES.
— 4	— 5	23	
— 8	—10	14	
—12	—15	5	
—14·4	—18	0	ZERO (Fahrenheit).

BAROMETER.

Millim.		Inches.
715	=	28·15
720	=	28·35
725	=	28·54
730	=	28·74
735	=	28·94
740	=	29·13
745	=	29·33
750	=	29·53
755	=	29·73
760	=	29·92
765	=	30·12
770	=	30·32
775	=	30·51
780	=	30·71
785	=	30·91
790	=	31·10

Inches.		Millim.
31	=	787·4
30	=	762·0
29	=	736·6
28	=	711·2
27	=	685·8

Intermediate heights, to be added to above.

Millim.		Inches.
1	=	·039
2	=	·079
3	=	·118
4	=	·158
5	=	·197

Inches.		Millim.
0·1	=	2·5
0·2	=	5·1
0·3	=	7·6
0·4	=	10·1
0·5	=	12·7
0·6	=	15·2
0·7	=	17·8
0·8	=	20·3
0·9	=	22·9

To reduce °F. to °C. subtract 32 and then multiply by 5/9.
To reduce °C. to °F. multiply by 9/5 and then add 32.

MEASURES OF TIME.

The earth's axial rotation is the phenomenon by which time is measured everywhere on the earth's surface. Experiment and observation show that, if we assume the earth to rotate uniformly, there are many other phenomena which are as accurately isochronous in their periodicity. That is to say, they pass again and again through all their phases in exactly the same interval of time as measured in terms of the earth's rotation. In the pendulum of a clock and the balance-wheel of a watch we have such isochronism very approximately realised. A little consideration will convince us that the measurement of time is really a comparison of periodic sequences. We cannot conceive any other mode of marking off time intervals than by some kind of motion of a periodic character. Our practical unit of time is essentially terrestrial.

SIDEREAL DAY.—The standard unit of time is the SIDEREAL DAY, being the period in which the earth turns once round on its axis. It is divided into sidereal hours, minutes, and seconds; but these measures of time are used by astronomers only.

MEAN SOLAR TIME.—A SECOND is the time of one swing of a pendulum adjusted so as to make 86,164·09 swings in a sidereal day. Seconds are usually subdivided decimally.

One MEAN SOLAR DAY = 24 hours = 1,440 minutes = 86,400 seconds = 1·00273791 sidereal day.

RELATION BETWEEN TIME AND LONGITUDE.—At any given instant the mean solar time at two stations differs by an amount proportional to their difference of longitude, the time at the eastern station being the earlier.

CORRESPONDING DIFFERENCES.

Longitude.	Time.	Longitude.	Time.
$15''$	1 second.	75°	5 hours.
$1'$	4 seconds.	90	6 ,,
$15'$	1 minute.	105	7 ,,
1°	4 minutes.	120	8 ,,
15°	1 hour.	135	9 ,,
30	2 hours.	150	10 ,,
45	3 ,,	165	11 ,,
60	4 ,,	180	12 ,,

To show the exact date of any event, the meridian at which the time is reckoned must be specified. One degree longitude at Equator = 60 nauts = 69·17 statute miles.

STANDARD, OR ZONE TIME.

Country.	Central Meridian.	Fast or Slow on Greenwich Time.*
Western Europe, Algeria	0°	Greenwich Time
Central Europe, Tunis, Congo, Angola, German South-West Africa	15° E.	1 h. fast
Eastern Europe, British South Africa, Egypt, Portuguese East Africa	30° E.	2 h. fast
Mauritius, Reunion and Seychelles	60° E.	4 h. fast
India (except Calcutta) and Ceylon	82½° E.	5½ h. fast
Calcutta	90° E.	6 h. fast
Burmah	97½° E.	6½ h. fast
Federated Malay States, Straits Settlements, and French Indo-China	105° E.	7 h. fast
Java	109° 48′ 37.5″ E.	7 h. 19 m. 14.5s. fast
Western Australia, Hong Kong, East Coast of China, Kiau Chau, Philippine Islands, British North Borneo, Labuan	120° E.	8 h. fast
Korea	127° 30′ E. ...	8½ h. fast
Japan, Seoul, and Chemulpo ...	135° E.	9 h. fast
South Australia and Guam ...	142° 30′ E. ...	9½ h. fast
New South Wales, Queensland, Tasmania, Victoria, New Guinea, and Caroline Island	150° E.	10 h. fast
New Zealand	172½° E.	11½ h. fast
Ascension	14° 15′ W. ...	57 m. slow
Iceland, Madeira, Liberia and Portuguese Guinea	15° W. ...	1 h. slow
America :		
Atlantic (New Brunswick, Nova Scotia, Prince Edward Island, Grenada, Trinidad, etc. ...	60° W.	4 h. slow
Eastern (Eastern U.S., Chili, Panama, Peru, etc.)	75° W.	5 h. slow
Central	90° W.	6 h. slow
Mountain	105° W.	7 h. slow
Pacific (British Columbia, etc.) ...	120° W.	8 h. slow
Alaska	135° W.	9 h. slow
Hawaii or Sandwich Islands ...	157° 30′ W. ...	10½ h. slow
Samoa	172½° W.... ...	11½ h. slow

*Greenwich time is used in France, Spain, Portugal, Belgium, Gibraltar and the Faroes.

BELL TIME ON BOARD SHIP.

The nautical day begins at noon and is divided into "watches" of four hours each, time being indicated by bells striking every half hour.

A.M.	A.M.	A.M.		P.M.	P.M.	P.M.
12.30	4.30	8.30	1 BELL	12.30	4.30	8.30
1.00	5.00	9.00	2 BELLS	1.00	5.00	9.00
1.30	5.30	9.30	3 BELLS	1.30	5.30	9.30
2.00	6.00	10.00	4 BELLS	2.00	6.00	10.00
2.30	6.30	10.30	5 BELLS	2.30	6.30	10.30
3.00	7.00	11.00	6 BELLS	3.00	7.00	11.00
3.30	7.30	11.30	7 BELLS	3.30	7.30	11.30
4.00	8.00	NOON	8 BELLS	4.00	8.00	MIDNIGHT.

CONCISE TABLES OF CONTINENTAL MONEYS.

(*Extracted by permission from Bradshaw's Continental Guide.*)

(1) A Concise Table of Foreign Monies, Reduced from English into the Currency of Other Countries at Par.

England.	France, Italy, Belgium, Switzerland.	Germany.	Holland.	United States.	Austria in Notes.	Russia in Notes.
£ s. d.	Frs. Cts.	Mks. Pfg.	Fl. Cts.	Dols. Cts.	Kronen.	Roubles.
0 0 0½	0 052	0 04	0 02	0 01	·04	·01
0 0 1	0 104	0 08	0 05	0 02	·08	·03
0 0 2	0 208	0 17	0 10	0 04	·18	·07
0 0 3	0 312	0 25	0 15	0 06	·26	·10
0 0 4	0 416	0 33	0 20	0 08	·38	·14
0 0 5	0 520	0 42	0 25	0 10	·48	·18
0 0 6	0 625	0 50	0 30	0 12	·56	·21
0 0 7	0 729	0 58	0 35	0 14	·66	·25
0 0 8	0 833	0 67	0 40	0 16	·76	·28
0 0 9	0 937	0 75	0 45	0 18	·86	·32
0 0 10	1 040	0 84	0 50	0 20	·96	·36
0 0 11	1 144	0 92	0 55	0 23	1·04	·39
0 1 0	1 25	1 0	0 60	0 25	1·20	·47
0 2 0	2 50	2 0	1 20	0 50	2·40	·95
0 3 0	3 75	3 0	1 80	0 75	3·60	1·42
0 4 0	5 0	4 0	2 40	1 0	4·80	1·90
0 5 0	6 25	5 0	3 0	1 25	6·	2·37
0 6 0	7 50	6 0	3 60	1 50	7·20	2·85
0 7 0	8 75	7 0	4 20	1 75	8·40	3·32
0 8 0	10 0	8 0	4 80	2 0	9·60	3·80
0 9 0	11 25	9 0	5 40	2 25	10·80	4·27
0 10 0	12 50	10 0	6 0	2 50	12·	4·75
0 11 0	13 75	11 0	6 60	2 75	13·20	5·22
0 12 0	15 0	12 0	7 20	3 0	14·40	5·70
0 13 0	16 25	13 0	7 80	3 25	15·60	6·17
0 14 0	17 50	14 0	8 40	3 50	16·80	6·65
0 15 0	18 75	15 0	9 0	3 75	18·	7·12
0 16 0	20 0	16 0	9 60	4 0	19·20	7·60
0 17 0	21 25	17 0	10 20	4 25	20·40	8·07
0 18 0	22 50	18 0	10 80	4 50	21·60	8·55
0 19 0	23 75	19 0	11 40	4 75	22·80	9·02
1 0 0	25 0	20 0	12 0	5 0	24·	9·40
2 0 0	50 0	40 0	24 0	10 0	48·	18·80
3 0 0	75 0	60 0	36 0	15 0	72·	28·20
4 0 0	100 0	80 0	48 0	20 0	96·	37·60
5 0 0	125 0	100 0	60 0	25 0	120·	47·
6 0 0	150 0	120 0	72 0	30 0	144·	56·40
7 0 0	175 0	140 0	84 0	35 0	168·	65·80
8 0 0	200 0	160 0	96 0	40 0	192·	75·20
9 0 0	225 0	180 0	108 0	45 0	216·	84·60
10 0 0	250 0	200 0	120 0	50 0	240·	94·

FOREIGN AND COLONIAL MONEYS WITH APPROXIMATE VALUE IN BRITISH CURRENCY IN TIMES OF PEACE.

ARGENTINE REPUBLIC.—Gold coin, 5 dollars. Silver coins, 1 dollar and 50, 20, and 10 centavos. Bronze coins, 2 and 1 centavos. Nickel coins, 20, 10, and 5 centavos. Silver dollar or peso = 4s. Money in circulation is chiefly paper, being converted at 44 cents gold to dollar = 1s. 9d. Gold dollar = 4s.

AUSTRALIA.—The same as in Great Britain.

AUSTRIA-HUNGARY.—Gold coins, 100 krone = £4 3s. 4d.; 20 krone = 16s. 8d.; 10 krone = 8s. 4d.; Single ducat = 11 crowns 29 heller = 9s. 4¾d. Silver coin, 1 krone = 100 heller = half gulden old coinage = 10d. Exchange about 24 krone to £. Silver gulden or florins (about 12 = £) = 100 kreutzer continue to be legal tender. Nickel, 20 heller = 10 kreutzer of old coinage = 2d., 10 heller = 5 kreutzer of old coinage = 1d. Bronze, 2 heller = 1 kreutzer = ⅕d., 1 heller = ½ kreutzer = $\frac{1}{10}$d.

BELGIUM.—The same as France.

BOLIVIA.—100 centavos = 1 boliviano (paper) = about 1s. 7d., or 12½ bolivianos to £. Coins in circulation are—silver, 50, 30, 20, and 10 centavos; nickel, 10 and 5 centavos, and English gold coin. Currency principally paper.

BRAZIL.—Currency paper, worth 1s. 4½d. per milreis (1,000 reis) or nearly 15 milrei = £1. Silver coinage of 2, 1, and ½ milreis pieces in circulation.

BRITISH HONDURAS.—100 centavos = 1 dollar (gold) = 4s. 1½d. British sovereign (= $4·86) and half sovereign, and U.S. gold coins legal. Silver coins—5, 10, 25 and 50 cents legal tender to $10. Bronze—1 cent legal tender to 50 cents.

BULGARIA.—Lev (= franc) = 100 stotinki = 9½d. (stotinka = centime). Gold coins, 10 and 20 leva, but foreign 10 and 20 franc pieces principally in circulation. Silver, ½, 1, 2 and 5 leva. Nickel, 2½, 5, 10, 20 stotinki. Bronze, 1, 2, 5, 10 stotinki.

CANADA.—1 cent = ½d. 100 cents = 1 dollar = about 4s. 1½d. 4 dollars 86⅔ cents = £ sterling. U.S. gold coins also legal.

CHILI.—Gold coins, 20 (colon or condor), 10 (doubloon), and 5 (escudo) peso pieces. Silver coins, 1 peso and $\frac{1}{5}$, $\frac{1}{10}$, and $\frac{1}{2}$ of a peso. Bronze coins, $\frac{1}{2}$, 1, 2 and $2\frac{1}{2}$ centavo pieces. Currency is paper—the peso or dollar = about 10d. The restoration of the gold currency is projected under a currency law which was to take effect in 1910, but has been since deferred. Gold peso = 1s. 6d. English sovereign has a legal value of $13\frac{1}{3}$ pesos gold.

CHINA.—1,220 (about) cash = 1 haikwan (or customs) tael = about 2s. $8\frac{1}{4}$d. About 35 cash = 1d. A coin recently issued is the "hundredth of a dollar" worth about $\frac{8}{25}$ **of 1d.** Silver dollar of same value as Japanese silver yen, is also current. At Hong Kong the dollar (1,000 cash) = about 1s. 11d. and at Shanghai about 2s. 8d. In October, 1908, an Imperial Edict decreed the establishment of a uniform Tael currency —unit silver tael to have a value of between 30d. and 40d.

COCHIN CHINA.—5 sapéques or cash = 1 cent; 100 cents = 1 dollar = about 2s.

COLOMBIA.—100 centavos = 1 peso or dollar gold—nominal value 4s. Gold coins, 1, $2\frac{1}{2}$ and 5 dollars. Silver coins, real, peseta, half-dollar and dollar. Very few coins are in circulation, the currency being principally paper, subject to considerable fluctuation. At the legal rate the paper peso = 1 centavo gold, or \$500 = £1.

DENMARK.—100 ore = 1 krone = 1s. $1\frac{1}{4}$d. 18 kroner 19 ore = £ sterling. Gold coins of 20 kroners and 10 kroners. Silver, 2 kroner (rigsdaler), 1 krone and 25 ore.

EGYPT.—$97\frac{1}{4}$ piastres = £ sterling. 100 piastres, or 1,000 milliemes = £ Egyptian (gold) = £1 0s. $6\frac{1}{4}$d. Gold circulating is almost exclusively English. 10 milliemes = 1 piastre = about $2\frac{1}{2}$d. Gold piece of 20 francs = about 77 piastres. Silver coins, 1, 2, 5, 10 and 20 piastres; legal tender to £E2.

ERITREA.—1 tallero = 5 Italian lire. Silver coins, 1, 2, 5 talleros.

FRANCE.—100 centimes = 1 franc = $9\frac{1}{2}$d. 20 franc piece (Louis or Napoleon) = 15s. 10d. About 25 francs 25 centimes = £ sterling. Gold coins of 5, 10, 20. 50, and 100 francs. Silver coins, 20 centimes, $\frac{1}{2}$, 1, 2, and 5 franc pieces. Nickel coin, 25 centimes. Bronze coins, 1, 2, 5, and 10 centimes.

GERMAN EMPIRE.—100 pfennig = 1 mark = about 1s. About 20·45 m. = £ sterling. Gold coins, 20 (doppel-krone), 10 (krone), and 5 (half-krone) marks. Silver coins, 1, 2, 3, and 5 marks and 50 pfennige. Thaler = 3 marks = 2s. 11d. Nickel coins, 20, 10, and 5 pfennige. Bronze coins, 1 and 2 pfennige.

GREECE.—100 lepta = 1 drachma paper = 9d. 27 drachmæ 30 lepta = £1 or about 108 drachmæ per 100 fcs. Foreign gold coins in circulation.

HOLLAND.—100 cents = 1 guilder or florin = 1s. 8d. 12 guilders 10 cents = £ sterling. Gold coins, 10 florins (16s.). Silver coins, 2½ guilders (rijksdaaler), 1 guilder, ½ guilder and 25 cents.

INDIA.—£1 = 15 rupees. 16 annas = 1 rupee = 1s. 4d. 3 pie = 1 pice, 12 pie = 1 anna = 1d. Lac of rupees = 100,000. Crore of rupees = 10,000,000.

ITALY.—100 centesimi = 1 lira = 9½d. About 25 lire 40 centesimi = £1 sterling. Gold coins, 100, 50, 20, and 10 lire. Silver coins, 5, 2, and 1 lira. Nickel coin, 20 centesimi. Bronze coins, 1, 2, 5, and 10 centesimi.

ITALIAN SOMALILAND.—Rupia, value L. It. 1·68 (= £$\frac{1}{15}$ ster.). Silver coins, 1 rupia, ½ rupia, ¼ rupia. Bronze coins, 1 besa (value L. It. 0·0168), 2 besas, 4 besas. 1 rupia is equal to 100 besas.

JAPAN.—10 rin = 1 sen = ¼d., 100 sen = 1 yen or dollar = 2s. 0½d. Gold coins, 5, 10, and 20 yen. Silver coins, 10, 20, and 50 sen. Nickel coin, 5 sen. Bronze coins, 1 sen and 5 rin. The unit of account is the gold yen.

LYBIA.—The same currency as in Italy.

MEXICO.—100 centavos = 1 dollar or peso (silver) = 2s. 0½d.

NORWAY.—100 ore = 1 kroner = 1s. 1¼d. Gold coins, 10 and 20 kroners. Exchange 18·19 krone = £ sterling. Paper money principally used; least value, 5 kroner. Below this amount, silver and copper coins.

PORTUGAL.—100 reis = 1 teston = 4d. 1,000 reis = 1 milreis. Paper milreis = about 4s. 1d. Gold coins, 1, 2, 5, and 10 milreis. Currency, principally paper. Conto = 1,000 milreis. In the Azores, 1 milrei = 3s. 6½d.

ROUMANIA.—1 leu = 100 bani = about 9½d. Gold coins, 5, 10, and 20 lei. Silver, 1 leu, 2 and 5 lei. Nickel, 5, 10 and 20 bani.

RUSSIA.—100 copecks = 1 rouble. Silver or paper rouble = 2s. 1½d. Gold coins—15 roubles (imperial), 10 roubles, 7·50 roubles (half-imperial), 5 roubles. 15 paper roubles = 10 roubles gold = roughly 1 guinea. Currency principally paper.

SERVIA.—Dinar = 1 franc = 9½d. Gold coins, 10 and 20 dinars. Silver, ½, 1, 2, 5 dinars. Bronze, 5 and 10 paras. Nickel, 5, 10, 20 paras.

SPAIN.—100 centimos = 1 peseta—about 26·70 pesetas to the £ sterling. Gold coins are 20, 10 and 5 peseta pieces. Silver coins, 1 and 5 pesetas.

STRAITS SETTLEMENT AND MALAY STATES.—Gold dollar = 2s. 4d. Silver coins—50, 20, 10 and 5 cent pieces—are legal tender to 2 dollars, but ½ dollar is unlimited tender. Copper coins —1, ½ and ¼ cents—are legal tender to 1 dollar.

SWEDEN.—Krona of 100 ore = 1s. 1¼d. or 18·19 kr. to the £1. Gold little used. Currency for 5 kr. or more mostly paper.

TURKEY.—40 paras = 1 piastre = 2¼d. nearly. 100 piastres = 1 lira turca or gold medjidie = 18s. 109½ pias = £1. "Purse," sometimes used in accounts = 500 piastres or 5 liras and is calculated = £4 10s. 0d. Value of piastre varies in different parts of the Turkish Dominions. In Syria, 1 Turkish £ = 130 local piastres and £1 = 143¼ local piastres.

UNITED STATES.—1 cent = about ½d., 100 cents = 1 dollar = 4s. 1½d. 4 dols. 87 cents = £ sterling. Gold coins, 2½ dollar piece, half eagle (5 dollars), 1 eagle (10 dollars), 1 double eagle (20 dollars).

URUGUAY.—100 centavos = 1 dollar (gold) = about 4s. 3d., or \$4·70 = £. Only foreign gold coins (which are legal tender) are in circulation. Silver coins, 10, 20 and 50 cents and 1 dollar. Nickel, 1, 2 and 5 cents.

VENEZUELA.—Medio = about 2½d.; real = about 5d. Monetary unit is silver bolivar = about 9½d., or 1 franc, or 25·25 bols. to the £. Exchange fluctuates slightly from the par, but 25·25 bols. to the £ should be taken as a basis. Currency is based on gold standard—no paper in circulation. Coins are gold, silver and nickel, but principal coin is silver dollar of 5 bols. known as "peso fuerte" or simply "fuerte."

PARTICULARS OF THE LEADING COMPANIES ENGAGED IN THE COMMERCIAL DEVELOPMENT OF WIRELESS TELEGRAPHY

Amalgamated Wireless (Australasia) Limited

Incorporated.—July 11th, 1913, in State of New South Wales.

Head Office.—" Wireless House," 97, Clarence Street, Sydney.

New Zealand Office.—Australasia Chambers, Wellington.

Directors.—Hugh Robert Denison (Chairman and Managing Director), Charles P. Bartholomew, Ernest T. Fisk, John H. Forrest.

Technical Manager.—Ernest T. Fisk.

Secretary.—John H. Forrest.

Capital.—£140,000 in 140,000 shares of £1 each. Issued 140,000 shares of £1 each, all fully paid up. The financial year of the Company ends at June 30th. The annual general meeting is held in August.

The Company owns the perpetual Licence to use and exploit the Marconi Patents in the Commonwealth of Australia and Dominions of New Zealand, and in that part of the Pacific and Indian Oceans bounded by the 20 deg. north and 60 deg. south latitude and the 110 deg. west and 110 deg. east longitude. It has a large organisation for manufacturing wireless telegraph apparatus, erection and operation of stations, and it operates its system on nearly a hundred passenger and cargo ships. The Company has acquired the sole licence and agency for the Poulsen system of radio-telegraphy as well as the sole agency of the Automatic Relay Telephones. The Company also holds exclusive agencies for a number of important applications in electricity.

Accounts.—The accounts are made up to June 30th and December 31st in each year. The profit and loss account for six months to June 30th, 1916, showed that the gross profit from trading account, radio-telegraphic traffic, ships' subsidies, etc., amounted to £15,096 16s. 3d., and after deducting all expenses (including depreciation), amounting to £10,404 14s. 6d., there was a net profit of £4,692 1s. 9d.

Reserve accounts at June 30th, 1916, stood at £16,941 16s. 0d., and cash on deposit and current account, £26,286 17s. 7d. Dividends, 1913-14, 4 per cent.; 1914-15, 6 per cent.

Compagnie Française Maritime et Coloniale de Télégraphie Sans Fil

Incorporated.—April 24th, 1903.

Head Office.—35, Boulevard des Capucines, Paris, France.

Directors.—Baron de la Chevrelière, Senatore G. Marconi, Alfred Musnier, John Dal Piaz, Charles Roux.

Secretary.—F. Gondry.

Engineer.—M. Tauléra.

Capital.—Authorised, 500,000 francs in 5,000 shares of 100 francs each. Issued, 300,000 francs in 3,000 shares of 100 francs, of which 1,000 are fully paid, whilst with regard to the other 2,000 shares there is a further liability of 50 francs per share. Besides these there are 200 Profit shares having no capital denomination. In January, 1916, the Directors decided to issue 2,000 shares of 100 francs each at 150 francs per share. The financial year of the Company ends at December 31st in each year. Dividends at the rate of 5 per cent. per annum have been paid on the capital shares of the Company in respect of each of the years 1906, 1907, 1908, 1909, 1910, and 1911, and 10 per cent. for the years 1912, 1913, 1914, and 1915. The Company owns and operates the wireless telegraph apparatus on over 123 vessels.

The Company holds the exclusive licence of Marconi's Wireless Telegraph Company, Limited, and the Marconi International Marine Communication Company, Limited, for France, its colonies and dependencies, and vessels flying the French flag.

Compagnie Générale de Radiotélégraphie, Société Anonyme

Incorporated.—January 15th, 1914.

Head Office.—63, Boulevard Haussmann, Paris.

Directors.—M. d'Arsonval, Membre de l'Institut de France (Président); MM. Gabion and Bitterli.

Manager.—M. L. Tronchon.

Technical Director.—M. G-E. Petit.

Chief Engineer.—M. G. Marie.

Capital.—1,500,000 francs, divided into 3,000 shares of 500 francs each, all issued and paid up.

Dividends.—Paid 6 per cent. for 1914 and 1915.

This Company purchased the assets of the Cie. Gle. Radiotélégraphique, incorporated in the year 1908. The Company owns and operates the patents Rochefort, Gaiffe, Colin, Jeance, Joly and C.G.R.

The Company owns and operates the wireless telegraph apparatus on more than 120 vessels of the French mercantile fleet, has furnished more than 500 stations to the French War-Marine, about 100 land stations all over the world, and more than 1,600 military portable sets.

Compagnie Universelle de Télégraphie et de Téléphonie Sans Fil

Incorporated.—September 25th, 1912.

Head Office.—20 bis, Rue la Boëtie, Paris.

Directors.—Lazare Weiller (Président), Marcel Bloch, Emile Chalançon, Baron de la Chevrelière, Alexandre Imbert, Godfrey C. Isaacs, René Robard, Ernest Georges Sins.

Secretary.—Georges Tharel.

Capital.—10,000,000 francs divided into 100,000 shares of 100 francs each, all subscribed and paid for in cash. 100,000 Parts Bénéficiaires have also been issued.

The financial year ends at March 31st.

The Company has acquired the whole of the patents in respect of wireless telegraphy or telephony which have been taken out in the name of Professor Rudolph Goldschmidt.

In 1913 Marconi's Wireless Telegraph Company, Limited, acquired an interest in the above Company.

Compañía Marconi de Telegrafía Sin Hilos del Rio de La Plata

Incorporated.—August 4th, 1906.

Head Office.—Tornquist Building, 132, San Martin, Buenos Aires, Argentine.

Directors.—Captain Guillermo José Nunes (President), Señor Florence O'Driscoll (Managing Director), Colonel Sir Thomas Holdich, K.C.M.G., K.C.I.E., C.B., Godfrey C. Isaacs, Senator G. Marconi, Señor J. A. Pilling, Señor Carlos Pereira Pinto, Dr. Julio Pueyrredon, Señor Enrique Schlieper, Sydney St. J. Steadman, Señor Antonio Terrarosa.

Secretary.—Señor Enrique Schlieper.

Engineer.—E. Berry.

Capital.—$2,000,000 gold, represented by 250,000 shares of $5 gold each, series "AA," fully paid, and 150,000 Preference shares (5 per cent. non-cumulative) of $5 gold each, series "BB," 35 per cent. has been called up on the "BB" shares. The balance is payable in instalments of 10 per cent. with not less than thirty days' notice. The financial year of the Company ends on May 31st.

The Company owns the Marconi patents and patent rights for the Argentine Republic, and has licences from Marconi's Wireless Telegraph Company, Limited, and the Marconi International Marine Communication Company, Limited, to work the Marconi system in the Republics of Argentine, Uruguay, and Paraquay. The Company has the permission of the Government to erect wireless telegraph stations within the territorial limits of the Argentine Republic and on vessels flying the Argentine flag. The Company is constructing a high-power wireless station in the Argentine Republic to communicate direct with a similar station in Europe, and the Argentine Government approved this project on August 10th, 1912.

Compañia Nacional de Telegrafia Sin Hilos

Incorporated.—December 24th, 1910.

Head Office.—Calle de Alcala 43, Madrid.

Directors.—Excmo. Sr. General Don José de Bascaran; Excmo. Sr. Senatore G. Marconi; Godfrey C. Isaacs; Excmo. Sr. Don Antonio Comyn, Conde de Albiz; Excmo. Sr. Don José Sanchez Guerra; Sr. Don Eduardo Estelat; Sr. Don Francisco Setuain; Sr. Don Jaime Macnaughtan and Sr. Don José Asensio.

Secretary.—Sr. Don José Asensio.

Capital.—6,500,000 pesetas, divided into 8,000 6 per cent. Participating Preference shares of 500 pesetas each, and 5,000 Ordinary shares of 500 pesetas each.

The financial year ends on December 31st.

This Company was formed to take over from La Compañia Concesionairia de Servicio Publico Español de Telegrafia sin Hilos, who were unable to carry out their obligations, the concession from the Spanish Government for the construction and exploitation of a public wireless telegraph service in Spain and its colonies. The Company has ten wireless telegraph land stations erected and working at Aranjuez, near Madrid, Cadiz, Barcelona, Teneriffe, Las Palmas, Vigo, Soller, Finisterre, Santander, and Cape Palos, and has further stations in course of construction. The Company holds an exclusive licence from Marconi's Wireless Telegraph Company, Limited, to use and exploit its patents in Spain and her colonies, except on vessels of the mercantile marine.

The Company proposes to establish a direct wireless telegraph service between Spain and England by means of the Marconi Company's station at Poldhu, Cornwall.

The Marconi International Marine Communication Company, Limited

Incorporated.—April 25th, 1900.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc., Godfrey C. Isaacs (Managing Director), Alfonso Marconi, H. S. Saunders, M. Travailleur, Captain H. Riall Sankey, C.B., R.E. (retired).

Manager.—W. W. Bradfield.

Secretary and Deputy Manager.—Henry W. Allen, F.C.I.S.

Marine Superintendent.—Captain C. V. Daly.

Capital.—Authorised and issued £350,000 in £1 shares. (43,016 shares were issued in November, 1916, to existing shareholders at 35s. per share.) 5½ per cent. first mortgage debentures (bearer). Authorised, £250,000. Issued and outstanding, £114,360 in £20 bonds. Secured (without trust deed) as a floating charge on the undertaking and all the property. Redeemable at par July 1st, 1941. Interest payable January 1st and July 1st.

Accounts and Dividends.—Accounts are made up to December 31st and usually submitted in June following. The accounts at December 31st, 1915, showed a profit of £63,630 for the year, and after payment of dividend and reserve for repayment of debentures £33,841 was carried forward. Reserve for repayment of debentures £8,810. General reserve account, £27,639. 5 per cent. dividend was paid for 1910, 7 per cent. for 1911, 10 per cent. for 1912, 1913, and 1914, 12½ per cent. for 1915. An interim dividend of 5 per cent. on account of the year 1916 was paid 1st February, 1917. (Last bearer coupon paid, No. 10.)

This Company was formed for the purpose of working throughout the world, except in the United States of America, Hawaii, Chili, and colonies or dependencies of those States, an exclusive licence for all maritime (being mercantile or yachting) purposes granted by Marconi's Wireless Telegraph Company, Limited. The Company has transferred

to Associated Companies its rights in Canada, Argentina, Uruguay, Australasia, and all European countries and their dependencies except Great Britain and Ireland and Italy. In 1909 the Company and Marconi's Wireless Telegraph Company, Limited, entered into an agreement with the Post Office, which provided, in consideration of the payment of £15,000, for the transfer to the Post Office of the coast stations in the United Kingdom. This Company owns and operates the wireless telegraph apparatus on about 1,500 vessels of the mercantile marine.

Marconi's Wireless Telegraph Company, Limited

Incorporated.—July 20th, 1897, as "Wireless Telegraph and Signal Co., Ltd."; name changed as above in March, 1900.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Senatore G. Marconi, G.C.V.O., LL.D., D.Sc. (Chairman), Godfrey C. Isaacs (Managing Director), Captain H. Riall Sankey, C.B., R.E. (retired), H. S. Saunders, Samuel Geoghegan, M.I.Mech.E., M.Inst.C.E.I., Alfonso Marconi.

Manager.—W. W. Bradfield.

Secretary and Deputy Manager.—Henry W. Allen, F.C.I.S.

Chief Engineer.—Andrew Gray.

This Company was formed to acquire Mr. Guglielmo Marconi's patents for wireless telegraphy in all countries except Italy, its colonies, and dependencies. The Company has substantial interests in the following Companies:—

Marconi Wireless Telegraph Company of America.
Marconi Wireless Telegraph Company of Canada, Limited.
The Marconi International Marine Communication Company, Limited.
Russian Company of Wireless Telegraphs and Telephones.
Amalgamated Wireless (Australasia), Limited.
Spanish and General Wireless Trust, Limited.
Société Anonyme Internationale de Télégraphie sans Fil.
Campañía Marconi de Telegrafia sin Hilos del Rio de La Plata.
Compagnie Universelle de Télégraphie et de Téléphonie sans Fil.
Relay Automatic Telephone Company, Limited.

In October, 1911, the Company took over the patents of the Lodge-Muirhead Syndicate, Limited. The Company has in hand contracts for the erection of wireless telegraph stations in many parts of the world. The Company owns the high-power wireless telegraph stations at Clifden, Ireland, and Poldhu, Cornwall, and has erected, or is erecting, other high-power wireless telegraph stations for account of its associated companies in Wales, New York, San Francisco, Honolulu, Buenos Aires, etc. In 1912 the Company erected new and extensive works at Chelmsford to enable it to cope with its rapidly increasing business.

Accounts and Dividends.—Accounts are made up at December 31st, and usually submitted in June following. The Company's accounts at December 31st, 1915, showed shares at cost in Associated Companies and Patents £1,383,657 (par value £2,484,369) and general reserve account £967,530. The profit for the year was £377,817, and after payment of dividends £307,546 was carried forward.

In respect of each of the years 1911, 1912, and 1913 the Company paid dividends of 17 per cent. on the preference shares and 20 per cent. on the ordinary shares; and in respect of 1914 and 1915 7 per cent. preference and 10 per cent. ordinary dividends were paid. (A 7 per cent. Preference dividend and a 5 per cent. Ordinary dividend on account of the year 1916 were paid 1st February, 1917.) (Last Bearer Coupons paid No. 12 Preference, No. 11 Ordinary.)

Capital.—Authorised £1,500,000 in 1,250,000 Ordinary shares of £1 each and 250,000 Cumulative Participating Preference shares of £1 each. The Preference shares are entitled to a cumulative dividend of 7 per cent., and, after the Ordinary shares have received a 10 per cent. non-cumulative dividend, to share pari passu with the latter shares in surplus profits remaining. Issued, 250,000 Preference shares and 1,222,688 Ordinary shares.

Marconi Wireless Telegraph Company of America

Incorporated.—November 22nd, 1899, under the laws of New Jersey.

New York Office.—Woolworth Building, 233, Broadway, New York.

Directors.—Hon. J. W. Griggs (President), Senatore G. Marconi, Edward J. Nally, John Bottomley (Vice-President), John L. Griggs, Godfrey C. Isaacs, James W. Pyke, James R. Sheffield, George S. De Sousa, J. Van Vechten Olcott, and Edward W. Harden.

Vice-President and General Manager.—Edward J. Nally.

Vice-President, Secretary and Treasurer.—John Bottomley.

Chief Engineer.—Roy A. Weagant.

Traffic Manager.—G. S. De Sousa.

Capital.—Increased to $10,000,000, divided into 2,000,000 shares of $5 each on April 18th, 1912. The financial year ends December 31st.

The Company has the sole right to use and exploit the Marconi patents in the United States of America, Hawaii, Philippine Islands, Cuba, Porto Rico, Alaska, and the Aleutian Islands, and also the patents of Sir Oliver Lodge, Professor Michael Pupin, Dr. Thomas A. Edison, Dr. James A. Fleming, Messrs. Weagant, Shoemaker, Fessenden, Bucher, Gray, Dunwoody and Franklin, and all patents owned by the National Electric Signalling Company of Pittsburg, Pa.

The Company owns in the United States some sixty land stations for communication with ships at sea, including a high-power station at Cape Cod capable of trasnmitting to vessels at sea to a distance of 2,000 miles. The Company owns and operates the wireless apparatus on approximately 500 ships of the mercantile marine.

Marconi Wireless Telegraph Company of Canada, Limited

Incorporated.—By special Act of the Dominion of Canada on August 13th, 1903.

Head Office.—Shaughnessy Building, 137, McGill Street, Montreal.

Directors.—Andrew A. Allan (President), Senatore G. Marconi

(Vice-President), Robert Bickerdike, M.P., G. M. Bosworth, J. N. Greenshields, K.C., Godfrey C. Isaacs, W. D. Birchall, J. H. Lauer (General Manager), E. J. Nally, Thomas Robb.

Secretary, Treasurer, and General Manager.—J. H. Lauer.

Chief Engineer.—Alex. E. Reoch.

Capital.—Authorised and issued capital, $5,000,000 in 1,000,000 shares of $5 each, fully paid. Special settling day on the London Stock Exchange, March 22nd, 1912, in 1,000,000 shares. The financial year of the Company ends at January 1st.

The Company owns the sole right to use and exploit the Marconi patents in the Dominion of Canada and the Colony of Newfoundland.

The Company concluded an agreement on April 5th, 1911, with the Canadian Government, which provided that the Company should operate and maintain on behalf of the Canadian Government the Wireless Telegraph stations on the eastern coasts of Canada, twenty in all, for a period of twenty years. On September 17th, 1912, a further agreement was entered into with the Canadian Government providing that the Marconi Company should operate and maintain, on behalf of the Canadian Government, nine Wireless Telegraph stations on the Great Lakes. This agreement to run concurrently with the one concluded on April 5th, 1911.

An agreement between the Newfoundland Government and the Company came into force on April 20th, 1912, under which the Canadian Marconi Company has an exclusive licence to work Wireless Telegraph stations in the Colony of Newfoundland. The agreement also provides for the Company to operate eight Wireless Telegraph land stations on behalf of the Government, and to erect and operate four further such stations.

The Company receives under the above two agreements subsidies amounting to approximately $95,000 per annum.

Under the agreements with the Newfoundland and Canadian Governments the following stations are operated:—

Ten stations for the Newfoundland Government, the controlling station of which, at Fogo, is the property of the Company.

Twenty-two stations in Eastern Canada and Newfoundland for the Canadian Government, three of which are the property of the Company.

Eight stations on the Great Lakes on behalf of the Canadian Government.

The Marconi Wireless Telegraph Company of Canada, Limited, owns the high-power Wireless Telegraph station at Glace Bay, by which, in conjunction with the station at Clifden, Ireland, a public Wireless Telegraph Service is conducted with Great Britain and the Continent of Europe. The Company owns and operates the Wireless Telegraph apparatus on nearly 100 vessels.

Improvements have been made to the Cape Race station, giving it a range of over 500 miles by day.

Under contract with the Canadian Government the Company has established permanent communication between Le Pas, Manitoba, and Port Nelson, Hudson Bay, a distance of 350 miles.

Russian Company of Wireless Telegraphs and Telephones

Incorporated.—October 8th, 1908.

Head Office.—14, Lopuchinskaia, Petrograd, Russia.

Directors.—Senatore G. Marconi, G. C. Isaacs, S. M. Eisenstein, Pierre de Balinski, M. Salberg, Adrian Simpson (Managing Director), Admiral I. F. Bostrem, I.R.N. (retired), L. M. Eisenstein (Deputy Director).

Secretary.—Leon Eisenstein.

Capital.—Originally 1,200,000 roubles in 12,000 shares of 100 roubles each. This capital was increased to 1,800,000 roubles in November, 1911, in order to enable the Company to acquire a licence from Marconi's Wireless Telegraph Company, Limited. The capital was further increased in 1913 to 2,400,000 roubles and in 1914 to 3,000,000 roubles, divided into 30,000 shares of 100 roubles each.

The financial year ends December 31st (Russian date).

Dividends.—In respect of the years 1912 and 1913 dividends of 6 per cent. have been paid and 15 per cent. in respect of 1914 and 1915.

The Company owns the Russian patents taken out in the name of S. M. Eisenstein, and also holds an exclusive licence to use and exploit the Marconi Company's patents in Russia (excluding stations for international communication or on vessels of Russian Mercantile Marine).

The Company has supplied the Russian Government with a large number of Wireless Telegraph stations, and has now a very large amount of work in hand for that Government. Communication has been established and messages exchanged between the Company's station at Petrograd and the Marconi Company's high-power station in Wales.

Société Anonyme Internationale de Télégraphie Sans Fil

Incorporated.—March 31st, 1913.

Head Office.—13, Rue Brederode, Brussels.

Capital.—2,250,000 francs, divided into 4,500 shares of 500 francs each, all issued and fully paid.

The last dividend paid was 7½ per cent. for the year 1913.

The financial year ends at December 31st.

The Company exploits Wireless Telegraphy on vessels of the mercantile marine of all European countries excepting the United Kingdom of Great Britain and Ireland, Germany, Austria-Hungary, Italy and France, and at the present time owns and operates Wireless Telegraph apparatus on over 200 vessels.

Société Française Radio-Electrique, Société Anonyme

Incorporated.—4th April, 1910.

Head Office.—10, Rue Auber, Paris.

Works.—Suresnes (Seine): 18, Rue de Nanterre, and 51, Rue Carnot, and Belfort: Société Alsacienne de Constructions Mécaniques.

Directors.—M. G. Ferrand (Président), MM. de Beaumont, Class, Desachy, Fondère, Fourneau, Girardeau, Lippens, and O. de Rivaud.

Manager.—M. A. Fondère.

Chief Engineers.—MM. Bethenod and Girardeau.

Capital.—1,500,000 Frs., divided into 15,000 shares of 100 Frs. each, all issued and paid up.

The Company owns and operates the patents of MM. J. Bethenod, E. Girardeau, and M. Latour.

Spanish and General Wireless Trust (The), Limited

Incorporated.—February 16th, 1912.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Godfrey C. Isaacs (Managing Director), Alfonso Marconi, Captain H. Riall Sankey, C.B., R.E. (retired), Henry S. Saunders.

Secretary.—Henry W. Allen, F.C.I.S.

Capital.—Authorised, £350,000 in 350,000 shares of £1 each. Issued, 249,007 shares of £1 each. The object of the Company is to hold shares in the subsidiary Marconi Companies, in particular those of the Compañía Nacioñal de Telegrafia sin Hilos, the denomination of whose shares renders them difficult to negotiate on the London Stock Exchange. The Company holds at present 12,350 Bearer shares of 500 pesetas each in La Compañía Nacioñal de Telegrafia sin Hilos.

At June 30th, 1916, the profit and loss account showed a credit balance of £1,295 4s. 9d.

Wireless Press (The), Limited (Private Company)

Incorporated.—October 7th, 1910, under the title of "The Marconi Press Agency, Ltd." Name changed July 11th, 1914.

Head Office.—Marconi House, Strand, London, W.C.

Directors.—Godfrey C. Isaacs, Captain H. Riall Sankey, C.B., R.E. (retired), Henry S. Saunders, C. B. Clay, W. W. Bradfield, Captain C. V. Daly, and Henry W. Allen (Manager).

Secretary.—H. W. Corby, F.C.I.S.

Capital.—£5,000 in 5,000 shares of £1 each.

The Company is registered at the G.P.O. as a News Agency; it publishes the monthly magazines, "The Wireless World" and "El Marconigrama," and various well known books dealing with the subject of wireless telegraphy.

BIOGRAPHICAL NOTICES

Abraham, Henri.—General Secretary of the Société Française de Physique from 1901 to 1913, now Professor of Physics at the Sorbonne in Paris.

Arco, Graf Georg von.—Born at Grossgorschütz, Germany, he was educated at Berlin University and the Technical High School, Charlottenburg. In 1898 he was appointed assistant to the late Professor Slaby in the department of wireless telegraphy; later he joined the Allgemeine Elektrizitäts Gesellschaft, Berlin, continuing at the same time his work on the Slaby-Arco system of wireless telegraphy, and in 1903 receiving the appointment of manager of the Gesellschaft für Drahtlose Telegraphie. In December, 1906, he carried out practical wireless telephony over a distance of 35 km. (21·7 miles). In 1912 he exhibited high-frequency apparatus at the International Radiotelegraph Congress in London.

Austin, Louis Winslow, Ph.D.—Head of the U.S. Naval Radiotelegraphic Laboratory, Washington, D.C. Son of Professor L. A. Austin, of Middlebury College; educated at Middlebury College, Clark University, and the Universities of Strassburg and Berlin. For a time he acted as assistant professor of physics at the University of Wisconsin, then joined the staff of the Physikalisch-Technische Reichsanstalt, Berlin, and has held his present position since 1908. Dr. Austin is especially interested in quantitative high frequency measurements, was a delegate to the International Radiotelegraphic Congress of London. During 1914 he held the office of President of the Institute of Radio Engineers.

Baker, T. Thorne.—Born March 19th, 1881. Educated at Mercers' School, London, and passed Intermediate Science examination at the University of London. After five years' work as research chemist he went to Paris in 1907 for the *Daily Mirror* to take up Prof. Korn's system of photo-telegraphy, and superintended the operation of the system between Manchester, Paris, and London. This was eventually superseded by a new system of his own invention. He has since devoted his time to high-frequency and X-ray research work.

Bangay, Raymond D.—Born at Lyme Regis in 1883. Mr. Bangay was educated at Epsom College and Finsbury Technical College, and joined the Marconi Company in 1902. After spending five years in America, during which time he was engaged in different branches of the Service, he returned to England and took up the study of Military Wireless Stations. In 1914 he was appointed Chief of the Field Station Department in the service of Marconi's Wireless Telegraph Co., Ltd. He is the author of "The Elementary Principles of Wireless Telegraphy."

Beggerow, Dr. Hans.—Born September 30th, 1874. Educated at the University of Berlin and at Freiburg-in-Breisgau, where he obtained his Doctorate. Since 1901 he has been expert adviser to

the German Admiralty in all matters concerning wireless telegraphy, and since 1906 he has occupied a similar position in the Prussian Army.

Bellini, Dr. Ettore.—Born at Foligno, Italy, on April 13th, 1876, and educated at Naples University. In 1901 he was appointed Electrical Engineer to the Royal Italian Navy, and in 1906 he became Chief of the Naval Electrical Laboratory at Venice, in which latter capacity he was responsible for carrying out research work dealing with the employment of wireless telegraphy on warships and submarines. Later, in conjunction with Capt. Tosi, he invented the Radiogoniometer, an apparatus for directive wireless telegraphy. In 1910 the Bellini-Tosi system was installed at the Boulogne-sur-Mer station of the French Post Office.

Bethenod, J. F. J., was born at Lyons in 1883, and went through a course of technical study at the Central School of that city. He has for a number of years acted as the Assistant of Professor André Blondel. From 1903 onward, he published a large number of theoretical articles on Electro-Dynamic Machinery, and has entered into business relationship with a number of Constructional Engineering Houses for the exploitation of his inventions. After a term of military service in the Engineers, when he served under Col. Ferrié, he specialised in wireless telegraphy. In this field, both scientific investigation and industrial practice owe several important contributions to his activities, a fact attested bv articles which have appeared in the various French and foreign magazines. A number of wireless stations of varying power have been installed, wherein his devices are utilised. Of recent years, M. Bethenod has turned his attention to high frequency alternators, and has built machines giving remarkable results. He now holds the post of Engineer-in-Chief to the French Société Radio-Electrique.

Blondel, André E.—Born in Chaumont, France, in 1863, and graduated at Paris University. He has been a frequent contributor to learned societies and technical journals on several subjects, including wireless telegraphy, in connection with which he invented, in 1893, a new apparatus which is known as the "Oscillograph," and which opened a fresh field for the study of alternate currents. He was the first to explain, mathematically, in 1893, the effect of inertia in the hunting of alternators. Among his other activities in wireless telegraphy, mention should be made of directed waves produced by a double aerial oscillating on the fifth harmonic, and also of a system of acoustically syntonic wireless telegraphy.

Blondlot, Professor Prosper René.—Born at Nancy in 1849. After completing his scientific studies in Paris, he returned to his native city, where he became Professor at the Faculty of Sciences. He is now an Hon. Professor and Correspondent of the Institute of France. Professor Blondlot has devoted considerable study to the problem of electromagnetic waves, the main object of his researches being to determine the speed of propagation of such waves. In the year 1891 he found for this speed the value 302,200 km. per second, and, in the year 1893, by another and quite different method, the value 297,200 km. per second.

Bradfield, William Walter.—Born in London in 1879. Mr. Bradfield's connection with wireless telegraphy dates from September 3rd, 1897, when he entered what was then known as the "Wireless Telegraph and Signal Co., Ltd." He acted as Electrical Assistant to Senatore Marconi all through the course of his experimental work in Radiotelegraphy on the Salisbury Plain, during 1897. In the year 1899 he installed the first wireless apparatus on British battleships, and a little later assisted in demonstrations to the United States Government on board the United States battleship *Massachusetts*. In 1901 similar demonstrations conducted by him for the French Government resulted in the establishment of wireless communication between the French Riviera and Corsica. In the same year he supervised the erection of the well-known station at Siasconset and the Nantucket Lightship. In 1902 Mr. Bradfield accepted the position of Chief Engineer to the Marconi Wireless Telegraph Co. of America, a post he held until 1908, when he returned to England as Deputy Manager of the Parent Company and of the Marconi International Marine Communication Co., Ltd. In 1910 he became the Manager of both concerns, a position which he still occupies.

Branly, Edouard.—Born at Amiens on October 23rd, 1844. He studied at St. Quentin College, and afterwards at Henry IV. College, Paris. He is a Fellow of the University, Doctor of Physical Science, and Doctor of Medicine. Some of his works relate to the electrical conductivity of radio-conductors. In 1900 the International Jury of Superior Precept Instruction awarded him a *grand prix* for his exhibition of radio-conductors, and the French Minister of Public Instruction made him a "Chevalier of the Legion of Honour" in recognition of the part he had played in connection with the discovery of "Wireless Telegraphy." He has constructed various independent distributing apparatus for producing tele-mechanical effects without wires. In January, 1911, he was elected a member of the Academy of Science, Paris.

Braun, Prof. Ferdinand.—Born at Fulda on June 6th, 1850, and studied at Marbourg and Berlin, graduating at the latter place in 1872. In October, 1895, he was appointed Director of the Physikalische Institut at Strassburg. His early works refer to mechanical oscillations, but for many years he has devoted himself mainly to electrical research, with special attention to wireless telegraphy. He has held several academic appointments of the highest importance, and is the author of numerous books and papers on wireless telegraphy and kindred subjects. In December, 1910, he received (with Senatore Marconi) the Nobel Prize for Physics.

Bright, Charles, F.R.S.E., M.Inst.C.E., M.I.Mech.E., M.I.E.E.—Consulting Engineer and Electrician to the Commonwealth of Australia. Born in London 1863 and educated at Lancing College and King's College. In 1881 he was articled to his father, the late Sir Charles Tilston Bright. Since that date he has been engaged, both as engineer and electrician, in the construction, testing, laying, and repairing of some 25,000 miles of submarine cable. He represented Australia as sole delegate at the International Radiotelegraphic Conference of 1912. He is a Vice-President of the Wireless Society of London.

Brown, Sidney George, M.I.E.E.—Born in 1873 in Chicago, U.S.A., of English parents, and brought to England when 18 months old. He received his education at Harrogate and London University. He made a special study of submarine telegraphy and is the inventor of the magnifying cable relay. In 1898 he invented the drum cable relay and the magnetic shunt. Since that date he has also devoted much attention to telephony and wireless telegraphy and has achieved some important results, such as the carbon telephone relay, telephone transmission on land trunk lines, the improved wireless telephone receiver, and other inventions. He is a Vice-President of the Wireless Society of London, and a member of the Institute of Electrical Engineers.

Bullard, Capt. W. H. G., U.S.N.—Born December 6th, 1866, in State of Pennsylvania, U.S.A. In 1886 he was graduated at the United States Naval Academy. He subsequently served on ships of the Navy on the Atlantic, South Atlantic, Pacific, and Asiatic Stations, with shore duty, which had particular reference to the science of Electrical Engineering and its Development, in which he had specialised throughout his career. From 1912 to 1916 Captain Bullard held the post of Superintendent of the Naval Radio Service. He was the first to occupy this position; and under his supervision the communication system of the Navy Department was developed and enlarged. He was one of the delegates-plenipotentiary of the United States at the International Conference for Safety of Life at Sea, held in London in November, 1913. He was in charge, on behalf of the United States Navy, of the wireless operations contained in the series of experiments carried out between the Eiffel Tower and Arlington to determine longitude by means of wireless telegraphy.

Burstyn, Dr. W.—Born in Austria in 1877, and educated at the University of Vienna. He started his career as an electrical engineer with the Siemens-Schuckert Werke at Charlottenburg and with the Gesellschaft für Drahtlose Telegraphie.

Chamberlain, Eugene Tyler.—Son of General Frank Chamberlain. He was born in Albany, N.Y., on September 28th, 1856. Educated at the Albany Academy and Harvard College, graduating with honours in Metaphysics in 1878. After being in business for two years, he took up journalism and acted as legislative and political correspondent to the Associated Press. In 1893 he came to Washington and was appointed Commissioner of Navigation by President Cleveland. In 1903, on the creation of the Department of Commerce and Labour, he joined others in urging the importance of wireless telegraphy as a means of promoting safety of life on merchant vessels at sea, and he has since played a prominent part in promoting legislation on this subject. He was a delegate for the U.S.A. to the Convention on Safety of Life at Sea, at London, 1914.

Chree, Charles.—Born 1860. Sc.D. of Cambridge; Hon. LL.D. of Aberdeen; F.R.S. Graduated M.A. at Aberdeen in 1879, with first-class honours in Mathematics and Natural Philosophy. At Cambridge in 1883 he obtained the high place of sixth wrangler, gaining also first-class honours in the final parts of the Mathe-

matical and Natural Science Triposes. He became Fellow of King's College, Cambridge, in 1885; and was re-elected as Research Fellow in 1891. He held the position of Superintendent of Kew Observatory since 1893, and is an ex-President of the Physical Society of London, besides being a member of the British Association Committee for Radiotelegraphic Investigation. During the last fifteen years he has been largely concerned with geophysics, especially terrestrial magnetism and atmospheric electricity. He is author of "Studies in Terrestrial Magnetism," and a contributor of articles in the last edition of the Encyclopædia Britannica.

Clarke, E. Russell.—Born in 1871, he was educated at Charterhouse and Pembroke College, Cambridge, where he took a first-class in the Mathematical Tripos of 1893, and was equally successful in the Mechanical Science Tripos of the succeeding year. He became a barrister of the Inner Temple in 1895. He specialises in cases of a scientific nature, and has an expert knowledge of the laws on patents, designs, and trade marks. He is an associate of the Institution of Civil Engineers, an associate and member of council of the Institution of Electrical Engineers, a member of council of the Institution of Automobile Engineers, and a Vice-President of the Wireless Society of London. For the last twelve years Mr. Clarke has been closely interested in the development of wireless telegraphy, and has erected two stations, one in London, and one at Penbydwl, Abergavenny, in Wales.

Cohen, Louis.—Born in 1876, he studied electrical engineering in Armour Institute of Technology, 1897-1901, and physics and mathematics in the University of Chicago and Columbia University, 1902-1905. He was on the Scientific Staff of the Bureau of Standards from 1905 to 1909 and Assistant Professor at the George Washington University, 1907-1909. In 1909 he was appointed chief of the research department of the National Electric Signalling Co., to take charge of the development of wireless apparatus. During his connection with that company he has also carried on extensive investigations in connection with the Heterodyne receiver. Since the latter part of 1912 he has been engaged in developing his own inventions in wireless telegraphy, particularly the Electrostatically Coupled Receiver, and recently he has also taken up the practice of consulting and research engineering. He is the author of the book "Formulæ and Tables for the Calculation of Alternating Current Problems," and has published scientific and technical papers dealing with problems in wireless telegraphy and kindred subjects.

Coursey, Philip R., B.Sc. (Eng.), F.P.S.L.—Born 1892. Educated at University College, London, and awarded Diploma in Electrical Engineering with Distinction. Graduated with first-class Honours in Electrical Engineering at the University of London. He subsequently acted as Assistant to Dr. J. A. Fleming, F.R.S., in the Electrical Engineering Department, and Research Laboratories of University College, London; and is at present engaged under the Admiralty in the Inspection of Wireless Telegraph Apparatus. He is the author of several papers on Radio-telegraphy and telephony, read before various societies.

Crawley, Major C. G., Royal Marine Artillery, M.I.E.E.—Deputy Inspector of Wireless Telegraphy, General Post Office. He was engaged at wireless telegraph work in the Navy from 1903 to 1913, when he entered the service of the Post Office, from which he was lent to the Admiralty for wireless work on the outbreak of war.

Crookes, Sir William, O.M., F.R.S., D.Sc. (Hon.), LL.D.—Born in London June 17th, 1832. He entered the Royal College of Chemistry in 1884 as a pupil of Dr. Hofmann, and gained the Ashburton Scholarship in 1849. Later on he became senior assistant to Dr. Hofmann, which position he retained until 1854, when he received the appointment of Superintendent of the Meteorological Department of Radcliffe Observatory, Oxford. He was elected a Fellow of the Royal Society in 1863. Although his career has been mainly devoted to chemical research, he has carried out a long series of original investigations in radiotelegraphy, and has also published some interesting articles on the subject. He is a past-president of the British Association, the Chemical Society, and the Institution of Electrical Engineers. In November, 1913, he was elected President of the Royal Society.

De Forest, Dr. Lee.—Born at Iowa, U.S.A., and graduated at Yale College. Since 1896 he has been actively interested in wireless telegraphy and has made material contributions to the radio art.

Desbarats, George Joseph, C.M.G., B.A.Sc.—Deputy Minister and Comptroller of the Canadian Naval Service. Born at Quebec, January 27th, 1861. Educated at the Public Schools; Terrebonne College, Ecole Polytechnique, Montreal (honours and gold medal, 1879); Laval University (B.A.Sc., 1901). Engineer on construction and other public works; assistant to late John Page, Chief Engineer of Canals; Inspector, Railway Construction, B.C., 1892-96; Engineer of Construction, Galops Canal, 1896-99; employed in hydraulic survey work, St. Lawrence River, three years; rebuilt and enlarged the Government shipyard, Sorel, Quebec, 1901; Government Agent, Sorel, 1908-9; Acting Deputy Minister of Marine and Fisheries, Ottawa, 1908-9; Deputy Minister, 1909-10; received present appointment, June, 1910. Plenipotentiary for Canada at the Radiotelegraph Conference held at London, England, 1902. Member of the Canadian Society Civil Engineers, 1897; Councillor, 1907; Vice-President, 1909; Councillor, Ecole Polytechnique, 1909.

Duddell, W., F.R.S.—Born in London in 1872, and educated privately in this country and in France. He carried out research work at the Central Technical College, London, between 1893 and 1900, and obtained a Whitworth Scholarship and Exhibition. In 1908 he read, in conjunction with Dr. E. W. Marchant, a paper on "Experiments on Alternate-Current Arcs by the Aid of Oscillographs" before the Institution of Electrical Engineers, and in 1900 he read a paper on "Rapid Variations of Current through the Direct-Current Arc." He received a gold medal for oscillographs at the Paris Exhibition of 1900, and at St. Louis in 1904, and also the Hughes Medal of the Royal Society. He was President of the Institution of Electrical Engineers for two years, 1912-1914. He was chairman of the meetings of the International

Scientific Radiotelegraphic Commissions held in Brussels in 1913 and 1914. He was also a member of the technical committee appointed by the Government in 1912 to consider the question of long-distance wireless telegraphy. He acted for three years as Consulting Engineer for Wireless Telegraphy at the Post Office, and is a member of the Admiralty Board of Invention and Research, and served for one year on the Munition Invention Board. He is also a Member of the Council for Industrial Research.

Eccles, W. H., D.Sc., A.R.C.S., M.I.E.E.—Born in Furness, Lancs, in 1875, and entered the Royal College of Science, South Kensington, in 1894. Three years later he was appointed demonstrator in the Physics Laboratory at the College, and in 1898 he graduated at the London University with first-class honours in Physics. In 1899 he entered Mr. Marconi's laboratory at Chelmsford and spent a great part of his time in the investigation of electrical oscillations of air wires and in "jiggers." He also devised a laboratory method for testing and classifying coherers, and results of a later study of coherers were presented as one of his D.Sc. theses. In 1901 Dr. Eccles was appointed head of the department of mathematics and physics at the South-Western Polytechnic, Chelsea, and afterwards University Reader in Graphics at University College, London. He is now Professor of Applied Physics and Electrical Engineering at the City and Guilds of London Technical College, Finsbury, E.C. He is secretary of the Physical Society, examiner in mathematics at the London University, and secretary of the British Association Committee for Radiotelegraphic Investigation.

Eichhorn, Gustav, Ph.D.—Born at Düsseldorf (Germany) on December 1st, 1867. After leaving the Realgymnasium he took up the study of physics, but this was interrupted by the death of his father, and for ten years he devoted himself to a business career; then he returned to the profession of his choice and continued his interrupted studies. After three years at Berlin, Munich, and Zürich, he took the degree in physics (Phil. Dr.) at the last-named University. He entered a wireless telegraph laboratory, and soon after he was appointed manager of experimental stations on the Baltic, where for about eighteen months he conducted a number of investigations. The results of these are incorporated in a book which was published in England and Germany. He has contributed to various technical journals and has invented a device which is used in connection with wave meters and other instruments. He returned to Zürich in 1905 and two years later launched the *Jahrbuch de drahtlosen Telegraphie und Telephonie*, which is now a well-known annual publication. He is still engaged in practical and theoretical work in wireless telegraphy and telephony.

Eisenstein, S. M.—Born at Kief, Mr. Eisenstein was educated at the University of that city, afterwards studying at the University of Berlin and the Charlottenburg Polytechnic. He first turned his attention to wireless telegraphy in 1900, and in 1904 obtained his preliminary wireless patent, and established a private experimental laboratory. General Soukomlinoff, then commanding the troops of the Kief Division, heard of the young wireless enthusiast

and encouraged him to carry out experiments on a large scale, eventually prevailing on the Russian War Office to provide the young scientist with sites for the erection of stations. The action, taken in consequence by the War Office, resulted in the realisation of the necessity for forming a wireless company; the project was speedily materialised and Mr. Eisenstein changed his headquarters from Kief to Petrograd. The new departure speedily justified itself, and in 1911 the original company coalesced with the Marconi Company, and the reconstructed Russian Organisation, with Mr. Eisenstein as Director and Principal Technical Adviser, assumed responsibility for the development of Russian wireless. Mr. Eisenstein is still the active and responsible chief of the "Russian Company of Wireless Telegraphs and Telephones."

Erskine-Murray, James, D.Sc., F.R.S.E., M.I.E.E.—Born in Edinburgh on October 24th, 1868, and after a course of six years' study under the late Lord Kelvin at Glasgow University he entered Trinity College, Cambridge, as a research student. From 1896 to 1898 he was assistant Professor of Physics and Electrical Engineering in the Heriot-Watt College, Edinburgh, and in 1898 he was appointed experimental assistant to Mr. Marconi. In 1900 he took up the post of lecturer and demonstrator in physics and electrical engineering at the University College, Nottingham, and in 1905 he was appointed to the lectureship in electrical engineering at the George Coates' Technical College, Paisley. In 1905 he took up consulting work in radiotelegraphy, and from 1907 to 1911 held the post of lecturer at the Northampton Institute, London. He has contributed papers to numerous learned societies, and is the author of several works on wireless telegraphy. In 1913 he joined the firm of Clark, Forde and Taylor, consulting engineers, and the firm is now Clark, Forde, Taylor, and Erskine-Murray.

Ferrié, Lt.-Colonel.—One of the French pioneers in Wireless Telegraphy, Colonel Ferrié was a member of the joint Military, Naval, and Telegraph Commission which inspected and reported to the French Government on the wireless station erected by the Marconi Company at Wimereux, in 1899, when the first cross-Channel working was achieved. He was also a member of the French Government Commission which watched the working of the Franco-Corsica communication by wireless in April, 1901. In 1904 he acted as the Official Representative of France at the International Electrical Congress at St. Louis (U.S.A.). Colonel Ferrié has, in the course of a long and brilliant career, contributed a large number of important articles and treatises dealing with Radio-Telegraphy which have won for him a high reputation among scientific men all over the world. At the present date he holds the Post of Technical Director of Military Wireless Telegraphy, being attached in that capacity to the Department of the French Ministry for War.

Fessenden, Reginald Aubrey.—Born at Milton, Canada, on October 6th, 1866. Educated at New York and Port Hope, Ontario. In 1886 he was appointed inspecting engineer to the Edison Company, N.Y. In 1892 he took up teaching work and conducted classes in physics and electrical engineering at Western University, and in 1893 he was

appointed Professor of Electrical Engineering at Western University, Philladelphia. In 1900 he was appointed special agent to the U.S. Weather Bureau. Since that date he has devoted much attention to the development of a system of wireless telegraphy known by his name, and he has also carried out important experiments in wireless telephony. He has contributed articles on wireless telegraphy and telephony to many technical journals.

Fleming, Dr. John Ambrose, F.R.S.—Born in Lancaster on November 29th, 1849. Educated at University College School, London; University College; the Royal School of Mines; and St. John's College, Cambridge; Hughes Gold Medallist of the Royal Society. In 1880 he was appointed demonstrator in mechanics and applied-science to the University of Cambridge, and when University College, Nottingham, was opened in 1881, Dr. Fleming was selected as first occupant of the chair of mathematics and physics. A little later on he resigned this professorship to remove to London. On the creation of the Pender Chair of Electrical Engineering in 1885, the Council of the University College, London, appointed Dr. Fleming first occupant of that chair. After the incorporation of the University College with the University of London the title of Dr. Fleming's chair was changed to that of Pender Professor in the University of London. In 1912 Dr. Fleming was appointed University Professor of Electrical Engineering in the University of London. He has been a large contributor to scientific literature and research, and is the author of numerous well-known text-books, amongst which may be mentioned particularly his books on wireless telegraphy. He has given many courses of lectures at the Royal Society of Arts and the Royal Institution on wireless telegraphy and other subjects. His inventions and writings have assisted greatly the development of radiotelegraphy. For his scientific researches he has been twice awarded the Institution Premium of the Institution of Electrical Engineers, and also a silver medal of the Royal Society of Arts.

Forberg, Olaf E.—Director of Telegraphs in Iceland, was born on November 22nd, 1871, in the Province of Finmark, in the north of Norway. At an early age he was attached to the Norwegian Telegraphic Service, first as a Telegraphic Clerk, later as the head of a station; from 1900 as the Manager of the Controlling Station "Violungsnes" in the Romsdal. During the years 1893 to 1904 Mr. Forberg conducted the erection of several new Telegraphic Plants in Norway. In 1905 he was designated by the Norwegian Board of Telegraphs (after having been approached by the Icelandic and Danish Governments) as qualified to superintend the erection stations and organisation of the Telegraphic system in Iceland. In the spring of 1905, Mr. Forberg went to Iceland for examination, and in 1906 he built the Telegraphic Line from Reykjavik to Seydisfjord. The following year he was appointed Director of Telegraphs in Iceland, and controls both the wired and wireless nexus of the island.

Franklin, Charles Samuel.—Born in 1879, Mr. Franklin received his engineering and scientific training at Finsbury Technical College, under Professor Sylvanus Thompson. After some time spent in

electrical work, first at Manchester and afterwards with the Norwich Electricity Company, Mr. Franklin joined the Marconi's Wireless Telegraph Company (then known as the "Wireless Telegraph and Signal Company") in 1899, and still remains in their service. He has during recent years been engaged (in conjunction with Mr. H. J. Round) in conducting experimental and research work on behalf of Senatore Marconi.

Frouin, M.—He is Director of the French Telegraphs and was one of his country's representatives at the International Radiotelegraphic Conference held in London in 1912.

Geoghegan, Samuel.—In 1875 he was appointed Chief Mechanical Engineer to Messrs. Arthur Guinness and Co., of Dublin, in whose service he spent thirty years. He is a member of the Institution of Mechanical Engineers, the Midland Institution of Mining, Civil and Mechanical Engineers, the Institution of Civil Engineers of Ireland, and a member of the Council of the Royal Dublin Society. Director of Marconi's Wireless Telegraph Co., Ltd.

Girardeau, Emile, Managing Director of the Société Française Radio-Electrique. Born in 1882, Monsieur Girardeau received his education at the Ecole Polytechnique (after which he joined the Army and served as an officer in the Engineers). He is the author of various works, on a number of subjects relating to wireless telegraphy, and has played an important part in the creation and organisation of the Société Française Radio-Electrique, of which he is at once the founder and managing director.

Glazebrook, R. T., C.B., M.A., D.Sc., F.R.S.—Born at Liverpool, September 18th, 1854. Educated at Trinity College, Cambridge, where, after taking his degree, he commenced a study of physics at the Cavendish Laboratories under Clerk Maxwell. In 1899 he was appointed by the Royal Society as the first Director of the National Physical Laboratory, which position he still holds. He is a member of the technical committee enquiring into the Imperial Wireless scheme.

Goldschmidt, Professor Dr. Rudolf.—Born March 19th, 1876, at Neu-Buckow, Mecklenburg, Germany. After finishing his education at Wiemar Municipal School, he studied engineering at Charlottenburg and Darmstadt Technical High School. In 1900 he was appointed engineer in the laboratory of the A.E.G. in Berlin. In 1901-2 he occupied the position of chief laboratory engineer and designer in Prague. In 1907 he became lecturer at Darmstadt Technical College. Here he practised as a consulting engineer, and also pursued the development of several inventions, chiefly occupying himself with the invention and design of high-frequency alternators for wireless telegraphy. In 1911 he established two large wireless stations at Elveisen, Province of Hanover, and Tuckerton, New Jersey, U.S.A., for wireless communication between Germany and America.

Goldsmith, Prof. Alfred N., B.Sc., Ph.D.—Born in New York City. Graduated from the College of the City of New York and Columbia University. Author of "Elements of Physics," "The Transmission of Canal Rays through Thin Partitions," "Radio Engineering at

the College of the City of New York," "The Engineering Measurements of Radiotelegraphy," "Radiotelephony," and other works. Research worker in radio communication, particularly radiotelephony. Director of Radio Engineering work at the College of the City of New York. Editor of the "Proceedings of the Institute of Radio Engineers," Chairman of the Standardisation Committee of the Institute of Radio Engineers (1915), and Member of Board of Direction of the Institute. Professor Goldsmith is a Fellow of the Institute of Radio Engineers, a Member of the American Institute of Electrical Engineers, and a member of the American Physical Society.

Gray, Andrew.—Born at Glasgow in 1873, and educated at the Glasgow University and Royal Technical College, taking the diploma of the latter in electrical engineering. On leaving college he served as assistant to the late Professor Andrew Jamieson, of the Royal Technical College. In 1893 he joined the West India and Panama Telegraph Company, Ltd., and served as assistant electrician, chief electrician, and telegraph engineer. He entered the service of the Marconi Company in 1899. He introduced the Marconi system to the Hawaiian Islands, and—with the assistance of Mr. T. E. Hobbs, also a member of the Marconi service—organised the telegraph working and trained the native operators of the Inter-island Telegraph Company of Honolulu. He received the appointment of Chief of Staff to the Marconi Company under Senatore Marconi in 1901, and became Chief Engineer in 1910. He has been an Associate of the Institution of Civil Engineers since 1898.

Hammond, John Hays, Jr.—Born in San Francisco, April 13th 1888, educated at Preparatory Schools in England and the U.S.; graduated from the Yale-Sheffield Scientific School in 1910. He has been working ever since on the development of the system of radio control of torpedoes and other moving bodies, and has made application for 137 U.S. patents. The Board of Ordnance and Fortifications of the U.S. Army and the Secretary of War have recommended to Congress that these applications be purchased in their entire rights by the U.S. for the sum of $830,000. Mr. Hammond is the originator of the system of aerocoastal patrol, comprising aeroplanes equipped with wireless, which has received the endorsement of President Wilson, the Secretary of Navy, and the Secretary of War. He has written for private circulation a four-volume treatise on the Art of Teledynamics. He has been Treasurer of the Institute of Radio Engineers, and Manager and Chairman of the Committee on Admissions. He is a member of the American Institute of Electrical Engineers and Associate Delegate to the International Telegraphic Conference in London in 1912.

Hogan, John L., Jr.—Born in Philadelphia, Pa., U.S.A. He attended Sheffild Scientific School of Yale University, specialising in physics and mathematics. He assisted Dr. Lee De Forest in his work on experimental and radiotelephony, and in the development of the grid audion in 1906 and 1907. In 1909 he joined the staff of the National Electric Signalling Company at Brant Rock, Mass., and in 1914 was appointed Chief Research Engineer of that Company.

He is the author of "The Heterodyne Receiving System," "Wireless Telegraphy in Railroad Service," "Transatlantic Radiotelegraphy," and numerous other articles and papers published in the Proceedings of the Institute of Radio Engineers, the *Electrician* (London), the *Electrical World*, the *Jahrbuch der D.T.U.T.*, etc. He is a Fellow of the Institute of Radio Engineers, and their Vice-President in 1916; a member of the American Association for the Advancement of Science, of the American Institute of Electrical Engineers, and honorary member of the Radio Club of Amercia. In 1916 he held the post of Chairman of the Standardisation Committee of the Institute of Radio Engineers. He is the holder of ten patents embodying inventions relating to radiotelegraphy.

Hope-Jones, Frank.—Chairman of the Wireless Society of London. He was born in 1867, and from 1890 to 1895 he was associated with his elder brother, Robert Hope-Jones, in some of his earliest applications of electricity to organ-building. Since then he has established the business of electric time service on a scientific basis. He is a member of the Institution of Electrical Engineers, the British Horological Institution, etc., and is author of numerous contributions to technical journals and to the Proceedings of Scientific Societies.

Howe, Prof. George William Osborn, D.Sc., M.I.E.E.—Born 1875, at Charlton, Kent, he received his education at Woolwich Polytechnic and Durham University. After nine years with Siemens Bros., at Woolwich, and Siemens and Halske, at Charlottenburg, and two years as lecturer at Hull Technical School, he was appointed lecturer and later Assistant-Professor of Electrical Engineering at the City and Guilds Engineering College. He is a D.Sc. of Durham and an honorary D.Sc. of Adelaide University. He has read several papers on radiotelegraphy before the British Association, the Physical Society, etc., and in 1912 was awarded the silver medal by the Royal Society of Arts for his paper on "Some Recent Developments in Wireless Telegraphy." He is on the Council of the Physical Society, and is a member of the Radiotelegraphic Research Committee of the British Association and of the British Committee of the International Radiotelegraphic Commission.

Hoyle, Lieut. Bertram.—Is a native of Oldham and obtained his technical and practical education at the School of Technology, Manchester, of which he is now an Associate. He also entered as a student at the Victoria University, Manchester, and in 1907 obtained the Certificate of that University in Technology, in the Department of Electrical Engineering; and also the Diploma of the School. He has since acquired the degree of M.Sc. Tech. of that University and is an A.M.I.E.E. He then entered the service of Messrs. Henry Simon, Ltd., Manchester; and later on that of Messrs. S. Z. de Ferranti Ltd., Hollinwood. In 1911 Mr. Hoyle obtained a post as Assistant Lecturer and Demonstrator in Electrical Engineering at the School of Technology, Manchester, which he still holds. Mr. Hoyle has had charge of the design and erection of the wireless station with which the School of Technology is now equipped. He enlisted in the early part of 1915 as a motor cycle despatch rider, and has served on the Western Front. In September, 1915, however, he was gazetted Lieut. R.N.V.R. He is author

of a number of interesting essays and monographs, including an original paper of great interest on "The Influence of Temperature and Pressure on the Sensitivity of the Carborundum Crystal Detector."

Illingworth, Arthur Holden, J.P., M.P.—Born 1865, has represented the Heywood Division of South-East Lancashire since 1915. He is Director of Messrs. Isaac Holden et Fils (France), Ltd., of Bradford, Croix, Roubaix, and Reims. On the construction of the War Cabinet formed by Mr. Lloyd George in December, 1916, Mr. Illingworth became Postmaster-General.

Isaacs, Godfrey C.—Educated in England, France and Germany. He began life in his father's business, and at eighteen years of age he was manager of the great concern which he had entered as a lad. In 1910 he was appointed Managing Director of Marconi's Wireless Telegraph Co., Ltd., and the Marconi International Marine Communication Co., Ltd.

Janet, Paul.—Professor of Physics at the University of Paris, Director of the Central Laboratory and of the High School of Electrity. He was born on January 10th, 1863, in Paris, and studied at the Lycée Louis-le-Grand and afterwards at the High School. He is a member of the French Society of Physics, the International Society of Electricians, and the Society of Civil Engineers of France. From 1886 to 1894 he was Professor of Physics at the University of Grenoble. Professor Janet has published several important works, and from the point of view of wireless telegraphy he was the first to make a successful experiment in electric resonance by means of high-frequency currents in 1892; this is the phenomena used to-day in wavemeters.

Kennedy, Sir A. B. W., F.R.S.—Born in London, March 17th, 1847. He has had great mechanical engineering experience and has been President of the Institution of Civil Engineers and the Institution of Mechanical Engineers. He has designed electric lighting and power stations for many corporations, and has also been engaged in railway work. He received the honour of knighthood in 1905 on account of his services to the Admiralty. He was a member of the technical Committee which was appointed by the Postmaster-General to consider the Imperial Wireless scheme. He is a civilian member of the Ordnance Board, and a member of the Munitions Inventions Panel. He is also consulting electrical engineer to the L.N.W.R. and the L.S.W.R.

Kennelly, A. E.—Born in Calaba, Bombay, December 17th, 1861. He was educated in England, Scotland, Belgium, France and Italy. He is a Past-President of the American Institute of Electrical Engineers, a member of the American Associated Illuminating Engineers; held the post of President, in 1916, of the Institute of Radio Engineers; acted as Vice-President of the International Electrical Congresses, Paris and Turin; and as General Secretary of the Congress at St. Louis, Mo., U.S.A. He left school in 1875 to become a telegraph operator in the Eastern Telegraph Company. In 1881 he was Chief Electrician on Cable Ship; Senior Electrician ship staff, E.T.C., 1886. From 1886-1892 he became principal elec-

trical assistant to Thomas A. Edison, in the laboratories at Orange, N.J.; Consulting Engineer in Philadelphia, and from 1893-1900 worked in partnership with E. J. Houston, of the Thomson-Houston Company. He was Engineer-in-Chief when the cables were laid from Vera Cruz to Campeche in 1902. Since then he has been Professor of Electrical Engineering at Harvard University and also at Massachusetts Institute of Technology, since 1914. He is a Corresponding-Fellow of the British Association for the Advancement of Science; a member of the Institution of Electrical Engineers of London, and has twice received one of its premiums for papers. He is now Director of Research Division of the Electrical Engineering Department, Massachusetts Institute of Technology, and Fellow of the American Academy of Arts and Sciences. He has written twenty-three books as author or collaborator, one of which is considered a standard elementary exposition of wireless telegraphy, and is author of more than 120 scientific papers. His honorary degrees include the S.D. degree of the University of Pittsburg and the A.M. degree of Harvard Unversity. In past years he has been Chairman and Secretary of Standards Committee, American Institute of Electrical Engineers, and Secretary of the American Committee of the International Electro Technical Commission. Professor Kennelly has specialised in alternating currents.

Kolster, Frederick A.—Born in Geneva, Switzerland, January 13th, 1883. He was educated in the Public Schools of Cambridge, Mass., and at Harvard University, and became assistant to John Stone Stone from 1902-1908, playing an active part in wireless engineering up to 1912. He then joined the scientific staff of the U.S. Bureau of Standards, and has since been closely associated with the radio work of the U.S. Government. He is the inventor of a direct reading decremeter and other devices, a Fellow of the Institute of Radio Engineers, and filled the position of Attaché to American delegation representing the U.S. in London International Radio Convention in 1912.

Korn, Professor Arthur.—Born at Breslau, Germany, May 20th, 1870. Dr. Korn studied at Leipzig and Paris in Mathematics and Physics. In 1903 he was appointed Professor of Physics at the University of Munich, retiring from that position in 1908. He is best known as the inventor of a system of telegraphic transmision of photographs, and in 1907 the first photograph was transmitted under his system from Munich to Berlin, a distance of 600 kilometres. Professor Korn has also invented a system of telautography. His work, entitled "Elektrische Fernphotographie und Aehnliches," appeared at Leipzic in 1904, and a larger work, entitled "Handbuch der Phototelegraphie und Telautographie," was published by him in 1911, in collaboration with Dr. Glatzel.

Latour, Marius, was born in October, 1875, and is a native of the South Western District of France. He owes his scientific and technical training to the Universty of Paris and to the Parisian Ecole Supérieure d'Electricité. M. Latour has, for many years past, acted as Consulting Engineer to the General Electric Company of America, and is the author of numerous inventions in the world of electro-

dynamics. From the start, he paid special attention to the construction of high frequency machines, which he originally attempted to design in the shape of monophase or polyphase machines grouped in cascade; later on he analysed the essential features of machines based on this principle, and showed their analogy and close relationship with those of Professor Goldschmidt. As long ago as 1904 he presented an original paper to the Technical Manager of the General Electric Company at Schenectady setting forth the principle of the reception of continuous waves by beats, and this principle of beat reception is to-day the one in general use. More recently M. Latour has specialised in the direction of constructing amplifiers of low and high frequency for wireless telegraphic reception, for the benefit of the French Société Radio-Electrique, of which he is consulting engineer.

Lodge, Sir Oliver, F.R.S.—Born at Penkhall, Staffs, on June 12th, 1851. He was educated at the Newport (Salop) Grammar School, and was intended for a business career, but being attracted to science he entered University College, London, in 1872, and graduated D.Sc. five years later. He was reader in natural philosophy at Bedford College for Women, and Assistant Professor of Physics in University College, London, for several years, then Professor of Physics in University College, Liverpool, for nineteen years, before being appointed, in 1900, the first Principal of the new Birmingham University. He was knighted in 1902. He has distinguished himself in various spheres of thought, and his original work includes investigations on lightning, the seat of the electromotive force in the voltaic cell, the phenomena of electrolysis and the speed of the ion, the motion of the ether near the earth, and electromagnetic waves and wireless telegraphy. His patent for syntonic wireless telegraphy has been acquired by the Marconi Co. He has held the position of President of the British Association as well as that of President of the Physical Society, and of the Society for Psychical Research, and has made many important contributions to the literature of science.

Lombardi, Dr. Luigi.—Born on August 21st, 1867, at Dronero (Italy). In 1890 he obtained the diploma of civil engineering at the Royal Engineering School of Turin. He gained the diploma in electricity at the Industrial Museum of Turin in 1891 and won the Gori-Feroni prize. He has been professor of electricity at the Zürich Polytechnic School (1895-97), at the Industrial Museum of Turin (1897-1900), and since 1901 at the Royal Polytechnic School in Naples. He has published a book on the "Scientific Principles of Electricity" and a text-book on electrotechnics, besides numerous papers on kindred subjects. He is the author of a study on the employment of condensers for the transmission of electricity, which obtained for him the Kramer Prize of the Lombard Institute. He is the inventor of a special high-tension electrical condenser. He was a delegate of the Italian Government at the St. Louis International Congress of Electricity, and has been President of the

International Congress held in Turin in 1911 as well as of several technical and scientific societies.

Loring, Commander F. G., R.N., M.I.E.E.—Inspector of Wireless Telegraphy at the General Post Office. He entered the Navy in 1882 (retired 1910). He was lieutenant on board H.M.S. *Victoria* when that vessel was rammed and sunk by H.M.S. *Camperdown* off Tripoli in 1893, and received the bronze medal of the Royal Humane Society for saving two lives. In charge of the Admiralty shore wireless telegraph stations from 1902-8. In 1906 he acted as delegate for the Admiralty at the Berlin International Conference on Wireless Telegraphy. In 1908 he was appointed Inspector of Wireless Telegraphy and he represented the Post Office at the International Conference on Wireless Telegraphy held in London in 1912. At the International Conference on the Safety of Life at Sea (London, January, 1914) he acted as technical adviser to the Board of Trade on all matters connected with wireless telegraphy.

McLachlan, Norman W.—Born at Long Town, Cumberland, on July 26th, 1888, Mr. McLachlan was educated first at Carlisle Grammar School and afterwards at the George Watson and at the Heriot-Watt Colleges (Edinburgh). In 1909 he started his career at Newcastle-on-Tyne as Lecturer in Engineering and Mathematics. In 1912 he graduated B.Sc. (Engineering), and in 1913 was appointed Superintendent to a Grand Technical Institute and Supervisor of Classes in Engineering Subjects in the Liverpool Branch Technical Institutes. He has recently devoted much time to research work in the Applied Electricity Laboratories of the Liverpool University, and is the author of "Practical Mathematics," besides publishing a number of papers in the Journal of the "Institution of Electrical Engineers" and the *Electrician* on "The Magnetic Behaviour of Iron." He recently read an important paper before the British Association on "Some Characteristic Curves of a Poulsen Arc Generator."

Maclean, Magnus.—Educated at Colbost General Assembly School and the Normal School and University of Glasgow, Professor Maclean was chief official assistant to Lord Kelvin for fifteen years. He is M.A. and D.Sc. of Glasgow University, and holds the post of Professor of Electrical Engineering in the Glasgow and West of Scotland Technical College. He has made many contributions to periodical literature besides publishing some important works on Modern Electrical Practice.

Madge, Henry Ashley, B.A., M.I.E.E.—Born February 1879, he was educated at Peterhouse, Cambridge (1898-1902), where he took honours in Mathematics and Mechanical Science (Engineering). From July, 1902, to September, 1903, he was employed by Marconi's Wireless Telegraph Co., Ltd., as junior engineer; from October, 1903, to January, 1904, he was at the Royal Naval College, Greenwich; from February, 1904, to March, 1905, Naval Instructor in H.M.S. *Vernon;* and in April, 1905, was appointed Expert in Wireless Telegraphy to the Admiralty.

Marchant, Edgar Walford, D.Sc., M.I.E.E.—David Jardine Professor of Electrical Engineering in the University of Liverpool. Born in 1876; educated at the Central Technical College, he obtained Siemens's medal and was elected to a Salomon's Scholarship of the Institution of Electrical Engineers. After serving an apprenticeship he was appointed Superintendent of Lord Blythswood's Laboratories and Workshops at Renfrew, N.B., where he carried out a number of investigations, including experiments in wireless telegraphy. Subsequently he acted for a year as senior assistant to the late Professor Silvanus P. Thompson, and in 1901 was appointed Lecturer and later (1903) Professor of Electrical Engineering in the University of Liverpool. He has published papers on the magnetisation of iron under the influence of a high-frequency discharge from a condenser, on the conditions affecting variations in strength of wireless signals, and on many other subjects. He was elected Chairman of the Manchester Local Section of the Institution of Electrical Engineers in 1913-14, and is President of the Liverpool Engineering Society and Vice-President of the Wireless Society of London. He was one of the British delegates at the International Scientific Commission on Wireless Telegraphy, held at Brussels in April, 1914.

Marchant, W. H.—Born in London, March 22nd, 1881. Took up experimental work in connection with wireless telegraphy in 1904. From 1906-1911 he served with the Deforest Syndicate, Poulsen Company, and Lepel and Anglo-German Wireless Companies, being chiefly engaged in experimental work. Since 1911 he has devoted himself mainly to literary work and to teaching.

Marconi, Alfonso.—Born at Bologna in 1865, he is about eight years older than his distinguished brother. He was educated at Bedford Grammar School in England and later at Technical Colleges in Florence and Leghorn. He joined the board of Marconi's Wireless Telegraph Company and the Marconi International Marine Communication Co., Ltd., in July, 1909.

Marconi, Senatore Guglielmo, G.C.V.O., LL.D., D.Sc.—Born at Bologna, in Italy, on April 25th, 1874, he is Irish on his mother's side. He was educated at Leghorn and Bologna University, and first began to interest himself in the problem of wireless telegraphy in 1895. In the following year he came to England, and took out the first patent ever granted for a practical system of wireless telegraphy by the use of electric waves. His earliest experiments in England were made at Westbourne Park. Shortly afterwards Mr. Marconi saw Sir W. H. Preece, and at his request made some experiments for him and the Post Office officials. Some further experiments were made in May, 1897, in the Bristol Channel, wireless communication being established between Lavernock and Brean Down, a distance of nine miles. On the invitation of the Italian Government, Mr. Marconi subsequently went to Spezia, where a land station was erected, which was kept in constant communication with two Italian battleships working from a distance of twelve miles. The Italian Government conferred upon Mr. Marconi the

honour of knighthood, and his system is now used extensively in Italy. On his return to England further experiments were conducted at Salisbury (between Salisbury and Bath, a distance of thirty-four miles). On July 20th, 1897, the Wireless Telegraph and Signal Co., Ltd.—now known as Marconi's Wireless Telegraph Co., Ltd.—was established, and two permanent stations were put up. In July, 1898, the Dublin *Express* gave day by day a Wireless Telegraphic report of the yacht races during Kingstown Regatta week, and proved the usefulness and facility with which the system can be applied to commercial purposes. Later Mr. Marconi established communication between Queen Victoria's residence at Osborne House, Isle of Wight, and the Royal yacht *Osborne*, and her late Majesty was kept apprised of the progress made by the then Prince of Wales during the process of recovery from a serious accident. In December, 1898, Mr. Marconi installed apparatus to provide communication between the South Foreland lighthouse and a lightship on the South Coast. Mr. Marconi is a member of the Institution of Electrical Engineers, and read a paper on "Wireless Telegraphy" before the members in 1899. Early in 1901 telegraphic communication was established between two points more than 250 miles distant, and at the end of that year Mr. Marconi transmitted signals from Poldhu, in Cornwall, to St. John's, Newfoundland. In February, 1912, he received on board the s.s. *Philadelphia*, in the presence of the officers, good messages on the tape when at a distance of over 1,500 miles from the transmitting station, and signals at over 2,000 miles. In December, 1902, the station established at Cape Breton, Nova Scotia, under a contract with the Canadian Government, for transatlantic wireless telegraphy, was put into communication with the Cornwall station at Poldhu, and inaugural messages were transmitted to H.M. the King of England, H.M. the King of Italy, and others, and to *The Times* newspaper. In October, 1903, during the voyage of the R.M.S. *Lucania*, Mr. Marconi established communication between this ship and the Marconi stations at Glace Bay, Canada, and Poldhu, Cornwall, England, and a bulletin was published and issued daily to each passenger. A powerful station at Clifden, on the West Coast of Ireland, was opened early in 1907, for the establishment of commercial communication with the American continent (Glace Bay). Mr. Marconi's work has been recognised by many governments and seats of learning; he has been decorated by the King of Italy and the Czar of Russia, is an honorary doctor of many universities, including Oxford, Glasgow, Aberdeen, Liverpool, and Pennsylvania, besides having received the freedom of the principal Italian cities. In 1909 (in conjunction with Professor Braun) he was accorded what is perhaps the highest distinction that can be obtained by any scientist—the Nobel Prize for Physics. In 1914 he was elected a senator in the Italian Parliament, being formally introduced to the Assembly on March 27th, 1915. On July 24th, 1914, the King bestowed upon him the Honorary Knighthood of the Grand Cross of the Victorian Order. He also holds many scientific awards granted by various societies and institutions, of which we may quote as a comparatively recent instance his presentation by the Royal Society of Arts, on April 12th, 1915, with their Albert Medal, annually granted for distin-

guished services to science. Amongst the more important papers recently read by this eminent scientist, we may mention a lecture on "Unexplained Phenomena and Unsolved Problems in Wireless Telegraphy," delivered at Rome before a distinguished audience, presided over by the King and Queen of Italy, on November 12th, 1916. Immediately on the declaration of war by Italy, Senatore Marconi placed his services at the disposal of King Victor, and was given the rank of Lieutenant in the Italian Army. He has been employed on important military missions to England by the Italian Government, and on July 29th, 1916, was promoted to be Captain "for exceptional services." At the beginning of September in the same year he was transferred from the Italian Engineer Service to be temporary Captain in the Navy.

Marriott, Robert Henry.—Born 1879. First experimented with wireless telegraphy in 1899, while student at the Ohio State University, U.S.A. In 1901 he was employed by the American Wireless Telephone and Telegraph Company, at Philadelphia, for which Company he erected stations at Breille, Galilee and Barnegat, N.J. He then became Chief Engineer of the Pacific and Continental Wireless Telephone and Telegraph Company, and in 1902 installed three stations in California, at Avalon, Santa Catalina Island, and San Pedro. In 1903 he was employed with the Carstarphen Electric Company at Denver, Colorado. In 1905 he constructed stations for the American De Forest Wireless Telegraph Company, and its successor, the United Wireless Telegraph Company, in Colorado, Wyoming, and Texas. He was placed in charge of this Company's construction and maintenance in 1910. In 1911 he entered the employ of the Marconi Wireless Telegraph Company, of America, and the following year entered the U.S. Government service as Radio Inspector. Chairman, 1916, Seattle Section Institute of Radio Engineers, member of the Committee on Standardisation, Fellow and Past-President, The Wireless Institute, 1909-1912. He is now expert radio aid, U.S. Navy.

Norman, Captain Sir Henry, M.P.—He is well known to the public as a politician, a keen traveller, and an accomplished man of letters. Sir Henry has always made the study of electricity one of his hobbies, and has followed the progress of wireless telegraphy with enthusiasm. He has a private wireless station in the grounds of "Honeyhanger," his home at Hindhead. Assistant Postmaster-General, 1910; Chairman, War Office Committee on Wireless Telegraphy, 1912; Member of Committee on National Telegraphic Research, and P.O. Telegraph Organisation Committee; Member of British Association Committee of Radiotelegraphic Investigation, and of the International Committee of Radiotelegraphic Research; a Vice-President of the Wireless Society of London; Fellow of the Physical Society; Fellow of the American Institute of Radio Engineers; F.R.G.S., Asso. I.E.E.

Petit, Gaston Emile.—Born in Paris in 1877, Electrical Engineer in the French Postes et Télégraphes in temporary leave; Technical Director of the Compagnie Générale Radiotélégraphique and of the Compagnie Générale de Radiotélégraphie. He was Chief of the

Service of Wireless Telegraphy at the French Postes et Télégraphes from 1905 to 1911; Member of the International Conference on Wireless Telegraphy held in Berlin in 1906.

Poulsen, Valdemar.—Born in Copenhagen, November 23rd, 1869. After pursuing a course of study at the University of Copenhagen he entered the technical department of the Copenhagen Telephone Company in 1893, and for a number of years superintended electrical testing operations. In 1904, in a paper sent to the Electrical Congress in St. Louis, he explained a method of producing continuous electrical oscillations of a relative high frequency and of a high intensity. He has been assisted by Professor Pedersen in the development of the Poulsen System of Wireless Telegraphy, which is based on this method.

Preece, Llewellyn.—Son of the late Sir William H. Preece. He is one of the principal partners in the firm of Preece, Cardew and Snell, Consulting Engineers to the Crown Agents to the Colonies, and to the High Commissioners of New Zealand and South Africa. During the last thirteen years he has been largely responsible for the wireless telegraph work in connection with the Crown Colonies, which has been placed in the hands of his firm.

Pupin, Dr. Michael I.—Director of Research Laboratory of Columbia University, U.S.A. Born in Hungary, October 4th, 1858, of pure Serb ancestry. In 1874 he went to the United States, where he studied at the Columbia University, graduating in 1883. His study was continued at Cambridge, England, and at Berlin, and, returning to the United States, he became Professor of Mathematical Physics at the Columbia University in 1891. Among his first original work may be mentioned the development of electrical resonance, before the introduction of wireless telegraphy. Patents issued to him on electrical selectivity were licensed to Marconi's Wireless Telegraph Company in 1903. He has worked extensively in the development of his inventions in connection with telephones and telegraphs, and many of his improvements are known by his name throughout the world. For the past two years he has been engaged in the development of a new method of electrical selectivity to be used in connection with wireless telegraphy. He has also been engaged in research work in wireless telephony.

Rayleigh, The Rt. Hon. Lord.—Born on November 12th, 1842. He was educated at Torquay and at Trinity College, Cambridge. In 1865 he graduated in the Mathematical Tripos as Senior Wrangler, and was awarded the first "Smith's Prize." His work in Physics has been of a varied and thorough character. He has contributed to the Royal Society some important communications on the "Propagation of Electrical Waves Round the Bend of the Earth." These, and other Memoirs, have been reprinted in 5 vols. of "Scientific Papers" (Cambridge University Press).

Redfield, William Cox.—United States Secretary of Commerce. Born at Albany, N.Y., June 18th, 1858. From 1885 to 1905 he was engaged in the manufacture of iron and steel forgings, tools, etc., at Brooklyn. From 1902-3 he acted as Commissioner of Public Works for the Borough of Brooklyn, and in 1910 was elected to the

62nd Congress to represent the 5th New York District. As Secretary of Commerce he is closely associated with wireless telegraphy in the United States, the department of which he is the chief being responsible for the enforcement of the wireless communication laws and the International Radiotelegraphic Convention.

Righi, Professor Augusto.—Born at Bologna in 1850, and educated at the University there. He was Professor of Physics from 1873 to 1880 at the Bologna Technical Institute; 1880 to 1885 at the Palermo University; from 1885 to 1889 at the Padua University; and since 1890 at the Bologna University. Professor Righi has published many important papers on physics, among which may be mentioned "Hertzian Waves," in 1900; "Telegraphy Without Wires" (in collaboration with B. Dessau), in 1902, etc.

Robison, Samuel S., Captain U.S. Navy and member of the Institute of Radio Engineers.—Born May 10th, 1867. He graduated from the U.S. Naval Academy in 1888, and from 1904-1906 was placed in personal charge of the Division of Radiotelegraphy in the Bureau of Equipment, Navy Department, and in general charge from 1909-1911. He has ever since been very closely associated with the further development of this section of Naval Radio work. He is the author of the "Manual of Wireless Telegraphy for Naval Electricians," first issued in 1906, and revised for several subsequent editions.

Saltzman, Lieutenant-Colonel C. McK.—He is a native of the State of Iowa, and graduated at the United States Military Academy at West Point in 1896. As a Cavalry officer he took part in the battles near Santiago de Cuba of the Spanish-American War of 1898, and later on acted as Signal Officer during the Insurrection in the Philippine Islands. In 1901 he was transferred to the Signal Corps of the U.S. Army, and has since been identified with the electrical, cable and radio work of the U.S. Army. Colonel Saltzman was for a number of years in charge of the Electrical Laboratory of the Signal Corps in Washington, where radio equipment of the U.S. Army is designed and tested, and has recently been in charge of the radio work of the U.S. Army on the Panama Canal. He represented the United States at the International Radiotelegraphic Conference in London in June, 1912.

Sankey, Captain M. P. H. Riall, C.B., R.E. (ret.).—This distinguished officer was born at Nenagh, Ireland, in 1853; educated in Switzerland; at the Royal Military Academy, Woolwich; and at the School of Military Engineering, Chatham. He then served in England, at Gibraltar, and as Instructor in Fortification at the Royal Military College, Kingston, Canada. On his return to this country he was posted to the Ordnance Survey, and had charge of the Trigonometrical Division, the Electrotyping Department and the Workshops. In 1889 he retired from the service to join the Board of Messrs. Willans and Robinson, Ltd., and in 1904 he took up consulting work. Shortly afterwards he joined the Boards of the Marconi Wireless Telegraph Company, Limited, and of the Marconi International Marine Communication Company, Limited. He is an accepted authority on thermo-dynamic problems. He is a member of the following institutions: Civil Engineers, Mechanical

Engineers, American Mechanical Engineers, Electrical Engineers, Iron and Steel, Naval Architects, and Gas Engineers. He is a member of the Governing Board of the National Physical Laboratory, and of the Wireless Telegraphy and Gaseous Explosives Committees of the British Association.

Sarnoff, David.—Was born in Russia, February, 1891, and entered the United States in July, 1900. Mr. Sarnoff started at the bottom of the business ladder in 1906, and in 1907 received an appointment as Wireless Operator at the Marconi Station located at Siasconset, Nantucket Island, Mass. Later on he served at various Ship and Shore Stations, and eventually became Manager at the Marconi Station at Sea Gate. He has held a number of responsible positions in the service of the American Marconi Company, of which he is now Commercial Manager. He was elected Secretary of the Institute of Radio Engineers for 1915 and 1916, and was renominated for 1917. Amongst the important articles on various subjects connected with Wireless for which he has been responsible, we may mention a paper read by him on Radio Traffic before the Institute of Radio Engineers, and a number of monographs on Wireless Telegraphy, delivered before the Maritime Exchange and the Association of Railway Telegraph Superintendents in New York.

Saunders, Henry Spearman.—Born April, 1841, he is the son of the Hon. Frederick Saunders, who was Treasurer of Ceylon, to which office the latter was succeeded by his eldest son, Sir Frederick Richard Saunders, K.C.M.G. Mr. Henry S. Saunders joined his parents in Ceylon at the age of eighteen, and he devoted himself with conspicuous ability and success to the public and commercial life of the colony. In 1899 Mr. Saunders joined the board of Marconi's Wireless Telegraph Company, and accompanied Mr. Marconi to America on board the s.s. *Philadelphia* in 1902.

Solari, Marquis Luigi.—Born in Turin, he was promoted officer of the Italian Royal Navy in 1890. He obtained the diploma of Electrical Engineer at the University of Turin in 1898. In 1900 he was in charge of the Laboratory of Wireless Telegraphy at the Royal Dockyard of Spezia. He superintended the installation of several land and ship stations. In 1902 he was in charge of the wireless telegraph station on board the Italian warship *Carlo Alberto* during the historic voyages of that vessel across the Atlantic and in the Mediterranean Sea, for the experiments on long distance wireless telegraphy, which were then conducted under the personal direction of Senatore Marconi. The Marquis Solari wrote the official report of the experiments made for the first time across the European continent between the Poldhu station (England) and the *Carlo Alberto* in the Mediterranean. In 1903 he was a delegate of the Italian Government at the Berlin Wireless Conference. In 1904-1905 he was in charge of the Wireless Telegraph Department of the Italian Ministry of Posts and Telegraphs, and in the month of September, 1904, as official delegate of the Italian Government at the International Congress of Electricity held at St. Louis, U.S.A., he read a paper on the Development of Wireless Telegraphy. He is

joint inventor with Professor Lori, of the Padua University, of a magnetic relay. He has published several papers on wireless telegraphy in various periodicals and reviews. Since 1906 he has devoted himself to the development of the Marconi system in Italy.

Squier, Lieutenant-Colonel George Owen.—Military attaché to the American Embassy in London. He was educated at John Hopkins University, Baltimore, where he gained the degree of Doctor of Physics in 1893, and worked as a research student under the late Professor Rowland. He was working in the laboratory of the late Sir William Preece at the Post Office at the time that Mr. Marconi conducted his early demonstrations before the officials of that organisation. On June 28th, 1911, an important treatise by him, dealing with multiplex telephony and telegraphy by means of waves guided by wires, was read before the American Institute of Electrical Engineers. He is the author of numerous papers on the subject of wireless telegraphy and has devoted special attention to the use of wireless telegraphy in military operations. In 1912 he was awarded the Elliott Cresson Gold Medal for his researches in multiplex telephony. In June, 1915, he presented a paper on "Cable Telegraphy" to the Physical Society of London advocating the adaptation of Wireless Engineering methods to ocean cables.

Stone Stone, John.—Studied electricity, chemistry, physics and mathematics at Columbia University and Johns Hopkins University. From 1890-1899 he was with the American Bell Telephone Company as experimentalist in its research laboratory. In 1892 he made some investigations in wireless telephony for that Company. In 1899 he was Consulting Electrical Engineer and expert for the Ladd Wireless Telephone Syndicate, experimenting on directional signalling. He was retained in 1900 by the Stone Wireless Telephone Syndicate, and in 1902 when the Stone Telegraph and Telephone Company was organised. He is the author of many scientific papers on wireless. He has been granted more than 100 U.S. patents in the radio field and a correspondingly large number of foreign patents. Fellow, American Academy of Arts and Sciences; Fellow American Association of Advanced Science; Fellow and Past-President, Institute of Radio Engineers; and a member or associate of the following societies: American Institute of Electrical Engineers. American Electro-Chemical Society, U.S. Navy Institute, Franklin Institute, Mathematics and Physic Club, Boston Scientific Society. His investigations have been principally directed along the lines of preventing interference in wireless telegraphy.

Swinburne, James, F.R.S.—Born at Inverness on February 28th, 1858, and educated at Clifton College. He has had a wide experience, and as far back as 1881 he was employed by Messrs. J. W. Swan and Co. to organise their lamp factory in Paris; later he went on a similar mission to America. He has practised as a consulting engineer since 1894, and has attained considerable eminence in various branches of science. As an expert on wireless telegraphy his fame has been recognised by the Government, who in 1912 appointed him a member of the Technical Committee considering

the Imperial Wireless Scheme. He is also a member of various scientific societies, and is on the Council of some. In 1902-3 he was President of the Institution of Electrical Engineers.

Swinton, Alan A. Campbell, F.R.S.—Born in Scotland in 1863, he commenced his career in 1882 in the famous Elswick Works, where he was apprenticed to the late Lord (then Sir William) Armstrong. In 1887 he went to London, where, since that date, he has practised as a consulting electrical engineer, and has been responsible for the carrying out of many large electrical installations. He is a director of a number of electricity supply and engineering manufacturing companies, and has been associated with the commercial development of the Parsons turbine and other important inventions. He is a member of the Institutions of Civil, Electrical, and Mechanical Engineers, and is a Past-President of the Röntgen Society. He has devoted considerable attention to scientific research, including wireless telegraphy, and is President of the Wireless Society of London. In 1915 he was elected a Fellow of the Royal Society.

Tesla, Nikola.—Born at Smiljan, Sika, Dalmatia, in 1857. One of the foremost of the world's electricians. Quite early in life he began to take delight in arithmetic and physics. He graduated at Carlstatt in 1873, and thenceforward devoted his energy to electrical studies and investigations; he went to Gratz, where, at the Polytechnic School, he prepared for work as Professor in mathematics and physics. Whilst there he was so struck with the objections to the use of commutators and brushes that he made up his mind to remedy that defect in dynamo-electric machines. About 1882 he proceeded to America, where he captured the attention of the whole world with his fascinating experiments on high-frequency electric currents. Since 1890 he has devoted himself almost entirely to studies of alternating currents of high frequency and very high potentials.

Tissot, Captain C.—Born at Brest in 1868, he entered the Naval School in 1884, taking up the study of science. Later he was appointed to the Chair of Physics at the Naval School. As Captain of a Frigate, he is now chief of the technical research department at the Central Naval Laboratory in Paris. He was one of the first to devote himself to the study of wireless telegraphy in France and has been largely instrumental in its technical development as well as its application to the French Navy. On the purely scientific side, Captain Tissot has carried out some valuable experiments to secure exact measurements in wireless telegraphy. He has also studied problems concerning detectors and made investigations concerning the practical applications of wireless telegraphy and telephony. It is due to Captain Tissot's initiative and to his efforts at the Bureau des Longitudes in Paris, in 1907, that the Eiffel Tower service of time signals was established in 1910.

Todd, David Wooster, Commander, U.S. Navy.—Born at Round Valley, California, June 29th, 1874; educated in private and public schools in Michigan, Nevada, and San Francisco, California; appointed to Naval Academy, 1891, was graduated in June, 1895; has served

at sea on the following vessels of the United States Navy: *Constellation, Monongahela, Olympia, Oregon, Wheeling, Rainbow, Chicago, Iowa, Newark, Denver, Monterey, Concord, Galveston, Wyoming,* and was last in command of the *Dixie.* Captain Todd has served ashore as instructor in ordnance at the Naval Academy; in charge of the Radio Division of the Bureau of Steam Engineering, Navy Department, as well as Assistant Superintendent of the Radio Service. He attended the International Radio-Telegraphic Conference in London, 1912, as a Delegate, and on August 3rd, 1916, was appointed Director Naval Communications, succeeding Captain W. H. G. Bullard, U.S. Navy, Superintendent of Naval Radio Service.

Torikata—*see* **Wichi Torikata.**

Travailleur, Maurice.—Born at Brussels in 1871 and graduated as engineer at Brussels University in 1893. At the age of twenty-six he was appointed electrical engineer to the late King of the Belgians. He was one of the founders of La Société Anonyme de Télégraphie Sans Fil in 1901, of which he is now managing director.

Tsiang Tseng-yi.—Director-General of the Chinese Telegraph Administration, is a native of the Haining District of the Chekiang Province. In 1904 he acquired the third degree of Literature at the Metropolitan Examination in Peking and was appointed as Junior Clerk of the Board of Revenues and soon afterwards transferred in the same rank to the Board of Communications (then known as Yuchuanpu) by its special recommendation for dealing with telegraph matters. The Chinese Telegraphs were then administered partly by a Commercial Company and partly by the Provincial Viceroys and Governors. Mr. Tsiang proposed that all the commercially and provincially owned telegraph lines be nationalised and placed under the direct control of the Yuchuanpu, so that the system might possibly be made uniform throughout the country. This proposal received the approval of the Government, and was put into operation. Since 1910 the Chinese Government has devoted a part of the telegraph revenues to the extension of the Telephone and Wireless telegraph services. In 1911 Mr. Tsiang, in the capacity of the Commissioner of Telegraphs of the Yuchuanpu, caused two powerful Radio stations to be established, one in Peking and the other at Nankin. Since their establishment the Wireless service has been greatly improved and extended to such localities as Shanghai, Woosung, Foochow, and Canton, along the coasts and Kalgan and Wuchang in the interior. Both the Ministries of War and Navy have followed in the steps of the Ministry of Communications by installing Radio stations for their respective purposes. Mr. Tsiang has served over ten years in the telegraph service, holding the following important positions: 1910-1911, the Commissioner of Telegraphs of the Yuchuanpu; 1913-1916, Chief of the Financial Department of Telegraphs, Posts and Navigation, and at present, Chief of the Telegraph Department and Director-General of Telegraphs of the Ministry of Communications, besides holding the post of Chairman of the Chinese Society of Electrical Science.

Turpain, Professor Albert.—Born at La Rochelle on December 2nd, 1867, he was employed in the Department of Posts and Telegraphs of France from 1884 to 1887. In 1888 he became a licentiate in physical science, and three years later a licentiate in mathematics, obtained his doctorate of science in 1889. Since 1894, when, as a tutor of physics at the Faculty of Science at Bordeaux, he succeeded in sending messages by means of wireless telegraphy from the equipment which was erected in the college buildings, he has experimented in wireless telegraphy with successful results. He applied himself to the question of tuning and in 1899 he experimented with a means for determining the direction of electromagnetic waves; he took up these experiments again in 1912. In 1911 he succeeded in obtaining graphic records of time signals by means of a micro-ampere-meter over a distance of 300 km. between Poitiers and Paris. He carried out successful experiments in recording photographically wireless telegraph signals which passed between Paris and Poitiers.

Vanni, Dr. Giuseppe.—Born at Albano Laziale (Rome) in 1862. Graduated in science in 1887, and went to Strassburg in 1890, where, under Professor Kohlrausch, of the Physical Institute, he occupied himself especially with the study of electrical measurements. In 1894 he was appointed to teach physics at the Collegio Romano, Rome, where he remained till 1912, when he was nominated professor and director of the physical laboratory of the Military Radiotelegraphic Institute in Rome. In 1912 he took part in the International Radiotelegraphic Conference of London as a member of the Italian delegation, and also at the Conferences held in Paris in 1912 and 1913. His works are principally concerned with electrology, electrical engineering, and electrical waves. By means of a hydraulic microphone of his invention he made interesting experiments in wireless telephony, and his paper on the "Progress and Actual State of Wireless Telegraphy and Telephony" gained for him in 1914 the Cagnola prize of the Royal Lombard Institute of Science and Literature, in Milan.

Walter, L. H., M.A., A.M.I.E.E.—Born in London in 1870, and educated at private schools in England and at Hanover, Germany; also at Trinity College, Cambridge (1894-8), where he took honours in Natural Sciences. He then became experimental assistant to Sir Hiram S. Maxim. In 1903 he was appointed Editor of *Science Abstracts*, when that publication was taken over by the Institution of Electrical Engineers, which position he still holds. He has invented several forms of detectors of electrical oscillations, and for his magnetic type of oscillation galvanometer was awarded the John Scott Medal. In 1905 he drew attention to the advantages of directive wireless telegraphy, and, associating himself with Captain Tosi and Dr. Bellini, at that time making their first experiments, he introduced the directive system, and the wireless compass, into England.

Weagant, Roy A.—Born at Morrisburg, Ontario, Canada, in 1881. Educated at Stanstead College, Stanstead, Quebec, Canada, and at McGill University, Montreal, Canada. Graduated from Electrical Engineering Course, 1905. Studied physics under Sir Ernest

Brotherford and first became interested in wireless through witnessing some of his experiments in Hertzian waves. Engineering experience: First with the Montreal Light, Heat, and Power Company, then the Westinghouse Electric Manufacturing Company, of Pittsburgh, Pa., and the De Laval Steam Turbine Company. Commercial wireless work: Took this up first in 1908 with Professor R. A. Fessenden. Entered service of Marconi Company in 1912. He is a Fellow of the Institute of Radio Engineers and member of its Board of Directors and Standardisation Committee.

Wichi Torikata.—Born in Japan in 1883, Mr. Wichi Torikata is now the Chief Engineer of the Wireless Section in the Japanese Department of Communications, and holds also the same position with regard to the Electric Material Section attached to the Electro Technical Laboratory. He was trained to the profession of Electrical Engineering in the Engineering College of Tokio Imperial University, graduating at the College in 1906. Ever since these early days he has devoted himself to the close study of Radiotelegraphy and Telephony, acting at one time as Assistant Engineer to Dr. Osuke Asano, ex-Director of the Electro Technical Laboratory. Later on he received the appointment of Chief Engineer to the Wireless Section of the Laboratory, a position which he continues to hold. More recently he undertook, in addition to his Wireless duties, to act as Chief Engineer of the Electrical Material Section at the Laboratory. A number of miscellaneous inventions stand to his credit, and amongst other devices, of which he is patentee, are included the Koseki or Mineral Detectors, and the T.Y.K. Oscillation Gap for use in Radiotelephony. The late Mikado of Japan recognised his services by awarding him the Fifth Degree of Decoration, bestowing this honour specifically for his services in connection with Wireless Detectors, whilst the Ruling Emperor has presented him with the Fourth Degree of Decoration on account of his Radiotelephonic Researches. Considerable attention was attracted by his essay on "Some Researches in Radiotelegraphy and Telephony," and the Senate of Tokio University marked their appreciation of his efforts by bestowing upon him in 1915 the title of "Dr. Engineer." In addition to the above-mentioned decorations he has received many prizes for technical work. These latter include the First Medal of the Japanese Electric Engineers' Society (established in 1888), besides the Academy Prize and Medal granted by the Japanese Imperial Academy. Mr. Torikata displays a special interest in the education of the rising generation, and holds the position of Lecturer in Raidotelegraphy and Telephony to the Electric Engineering College of Kyusliu Imperial University.

Wien, Professor Max.—Born at Königsberg in 1866. He made a special study of the subject of physics under Helmholtz and others, and assisted Röntgen from 1891 to 1893. He has devoted considerable attention to the study of electromagnetic waves and their propagation.

Zenneck, Professor J.—Born April 15th, 1871, in Wurtemburg. The son of a clergyman, he was intended for a similar career, and studied for four years in a Theological College at Tübingen. While at

Tübingen he studied mathematics and natural history, particularly zoology, from 1889 to 1894, and in the latter year he passed the State examination in these subjects; he obtained his doctorate in 1894. After a course of natural history studies in London and elsewhere he devoted himself entirely to physics, and from 1895 to 1899 he was an assistant in the Physical Institute in Strassburg. From 1899 to 1900 he was engaged in making tests with wireless telegraphy in the North Sea. Five years later he became lecturer as assistant professor of Physics in the Technical College, Dantzic, and in 1906 he was appointed professor of Physics at the Technical College, Brunswick. This position he vacated in 1909, when he joined one of the largest mechanical works in Germany, and in 1911 he returned to Dantzic as professor of the Technical College.

LITERATURE OF WIRELESS TELEGRAPHY AND TELEPHONY.

THE literature upon the subject of wireless telegraphy and telephony has now become so large that the following collection of representative books and journals should be found useful. The bibliography is by no means complete, but we think that few, if any, of the important works are not included. In addition, there are the reports of the various International Radiotelegraphic Conferences and the "Nomenclature" issued by the Berne Bureau.

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La Télégraphie Sans Fil. By LEON VAN AERSCHODT. Pp. 27. 0·50 francs. Larcier, Brussels, 1913.

La Télégraphie Sans Fil Appliquée à la Météorologie aux Prévisions du Temps, et à l'étude de la physique du globe. By A. BOUTQUIN. Pp. 40. 1 franc. Larcier, Brussels, 1911.

La Télégraphie Sans Fil et la Téléphonie Sans Fil. By F. FONTAINE. Pp. 115, 1 figure. 3 francs. Imprimerie La Meuse, Liége, 1911.

Note sur la Télégraphie Sans Fil. By M. PIERARD, Professor at Brussels University.

BRAZIL.

Telegrapho Sem Fio. By RICARDO FREDERICO DE LIMA. Published by Officina Typographica da Escola Gerson, Rio de Janeiro.

DENMARK.

Laerebog I Radiotelegrafi Og Radioteleoni. By H. SCHLEDERMANN. Kr. 6.50.

FRANCE.

Carnet d'Enregistrement des Dépêches Météorologiques Transmises par Télégraphie Sans Fil. Avec Instructions Pratiques pour la Lecture et la Traduction de ces Dépêches. 2nd edition. 1 franc. L. Geisler, 1, Rue de Médicis, Paris.

La Technique de la Radiotélégraphie. By REIN. Translated from the German by G. Viard. 9 francs. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.

La Télégraphie Sans Fil. By BERGET. Francs 2.50. Hachette et Cie., Paris.

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La Télégraphie Sans Fil. By E. CONSTET. 100 pp. Francs 1.25. Charles Mendel, 118, rue d'Assas, Paris.

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La Télégraphie Sans Fil et La Loi. By A. PERRET-MAISONNEUVE. With Preface by M. DALIMIER. 7 francs. H. Desforges, 29, Quai des Grands-Augustins, Paris.

La Télégraphie Sans Fil et les Ondes Électriques. By J. BOULANGER et G. FERRIÉ. Pp. 471. 10 francs. Berger-Levrault et Cie, Paris.

La Télégraphie Sans Fil (la Télémécanique et la Téléphonie Sans Fil à la Portée de Tout le Monde). By R. MONIER. Preface by DR. BRANLY. Pp. 242. Librairie Dunod et Pinat, Paris.

Les Applications de la Télégraphie Sans Fil. By P. JÉGOU. Pp. 70. Librairie Desforges, Paris.

Les Applications de la Télégraphie Sans Fil (Traité pratique pour la réception des signaux horaires et des radiotélégrammes météorologiques). By R. ROTHÉ. 4 francs. Berger-Levrault, Editeurs, 5, Rue des Beaux-Arts.

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Les Oscillations Electriques (Principes de la Télégraphie Sans Fil). By C. TISSOT. Octave Doin and Fils, Éditeurs, 8, Place de l'Odéon, Paris.

Les Oscillations Electro-Magnetiques et la Télégraphie Sans Fil. By J. ZENNECK. Translated from the German by G. Blanchin, G. Guérard and E. Picot. 2 volumes. Part I., 17 francs. Part II., 17 francs. Gauthier-Villars, Editeurs, 55, Quai des Grands Augustins, Paris.

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Alpha Wireless Association—Valparaiso, Ind. M. E. Packman, Pres.; J. S. Webb, Sec. and Treas., 757, Greenwich Street.

Amateur Wireless Telegraph Club of Calif.—Capitola, Calif, Box 55.

Amateur Radio Association of New Bedford—New Bedford, Mass. D. Tripp, 26, Ward Street.

Amateur Wireless Association—Bozeman, Mont. M. Mitchel.

American Radio Relay League—Hartford, Conn. C. E. Tuska.

Ark. Wireless Association—Little Rock, Ark. 216, W. 20th Street. G. O. Ranch.

Arlington Radio Club—Arlington Heights, Mass. H. Bixby, 65, Hillside Avenue.

Armour Radio Association, Chicago, Ill.—R. H. Mathews, 1316, Carmen Avenue.

Astoria Amateur Wireless Association—Astoria, Oregon. E. P. Hawkins, Pres., 556, Grand Avenue.

Atlanta Wireless Association—159, Capitol Avenue, Atlanta, Ga.

Atlanta Radio Club—Atlanta, Ga. M. Herzog, 16, Faith.

Austin Radio Association—Austin, Tex. D. Harrell, Jr., Sec., Box 663.

Bellevue Radio Chain—Lincoln Avenue, Bellevue, Pa. C. Wray.

Birmingham Wireless Association—1428, Fountain Avenue, Birmingham, Ala. H. Ansley.

Bloomfield Radio Club—Bloomfield, N.J. F. McKinney, 300, Glenwood Avenue.

Boise Radio Club, 715, N. 9th Street. Boise, Idaho.

Bradentown Radio Club—Bradentown, Fla. H. Hurlebaus, 439, Main Street.

Bronx Radio Club—Bronx, N.Y. City. M. Berlin, 3814, Park Avenue.

Bronx Wireless Association—500, East 165th Street, Bronx, N.Y.

Buckeye Radio Association—Lima, Ohio. E. E. Aker, Jr.

Burlington H. School Science Club—Burlington, Iowa. F. Behrmaster.

Capital City Radio Club—Washington, D.C. J. Gamble, 1101, Potamac Avenue, S.E.

Cape May County Radio Association—Wildwood, N.J. E. Schlichting, 224, E. Burk Avenue.

Carrollton Wireless Club—Carrollton, Ill. S. W. Pierson.

Catskill Radio Club—E. C. Hocmer, Jr., Catskill, N.Y., U.S.A.

Central Radio Association—Little Rock, Ark. J. M. Clayton, D.M.

Central Radio Association—Denver, Colo. W. H. Smith, D.M.

Central Radio Association—Urbana, Ill. C. S. Hunt, R.R. 12.

Central Radio Association—Indianapolis, Ind. H. Silcox, D.M.

Central Radio Association—Cresco, Ia. W. Rathert, D.M.

Central Radio Association—Chanute, Kansas. H. B. Williams.

Central Radio Association—Independence, Kan. J. Jakowsky, President.

Central Radio Association—Lawrence, Kansas. S. Kruse, Asst. Sec.

Central Radio Association—St. John, Kansas. D. Sheperd, D.M.

Central Radio Association—Albion, Mich. C. Dean, D.M.

Central Radio Association—St. Paul, Minn. E. Dennis, D.M.

Central Radio Association—Kansas City, Mo. R. Moore.

Central Radio Association—Lincoln, Nebr. G. Bushnell, D.M.

Central Radio Association—Lima, Ohio. L. Clausing, D.M.

Central Radio Association—Tiffin, Ohio. H. Buck.

Central Radio Association—Van Wert, Ohio. L. Young, D.M.

Central Radio Association—Muskogee, Okla. T. Reid, D.M.

Central Radio Association—Austin, Tex. W. Tilley, D.M.

Chicago Radio Club—Chicago, Ill. E. Markowitz, 1468, N. Ashland Avenue.

Chicago Wireless Association—4418, S. Wabash Avenue, Chicago, Ill.

Chicago Wireless Association—F. D. Northland, 24, Scott Street, Chicago, Ill.

Cincinnati Wireless Club—1839, Hopkins Street.

Citries Belt Radio Association—Pomona, Calif. Sec., H. Clewitt, 1006, S. Reservoir Street.

Colorado Wireless Association—600, Y.M.C.A. Building, Denver, Colo. L. Hough, 1060, Josephine Street.

Colorado Wireless Association—Y.M.C.A., Denver, Colo. H. Whitman, 2252, Washington Street.

Columbus Radio Association—Columbus, Ind. F. Crump.

College of the City of N.Y.—N.Y. City. H. Kayser, 41, Convent Avenue.

Conn Valley Radio Club—Springfield, Mass. G. Beecher, 416, Allen Street.

Council Bluffs Radio Association—Council Bluffs, Ia. J. Dean, 1630, Douglas Street.

Crescent Bay Radio Association—1148, 5th Street, Santa Monica, Cal. E. Forsythe, Sec.

Dallas Texas Club—Dallas, Texas. M. Hunt, 808½, Commerce Street.

De Kalb Radio Transmission Club—215, Augusta Avenue. DeKalb, Ill.

Detroit Radio Club, The—Detroit, Mich. C. Barton.

Dodges Radio Institute—Valparaiso, Ind.

Dorchester Wireless Association—R. F. Lufkin, 222, Harvard Street, Dorchester, Mass.

Dot and Dash Club—E. Orange, N.J. T. Brothers, 38, Amhurst Street.

E. Buffalo Wireless Club—701, Walden Avenue, Buffalo, N.Y.

East Night High School Radio Club—Cincinnati, Ohio. W. Finch.

East Side Y.M.C.A. Radio Club—153, E. 86th Street. J. DiBlasi.

East Tennessee Wireless Club—723, N. 3rd Street, Knoxville, Tenn.

Electric St. Louis Wireless Club—2008, Allen Avenue, St. Louis, Mo.

Englewood High School Wireless Association—Chicago, Ill. A. G. Whitmer, 452, W. 60th Street.

Erasmus Hall High School—Flatbush Avenue, Brooklyn, N.Y. C. Robertson.

Ever Ready Wireless Club—167, E. 71st Street, N.Y. City.

Experimental Club of Cincinnati—1214, Jackson Street, Cincinnati, Ohio.

Experimental Radio Association—Washington, D.C. J. Alden, 124, Bryant Street, N.W.

Farmington Valley Radio Club—G. W. Tucker, Tariffville, Conn.

Fargo Radio Association—Fargo, N.D. E. Hooper, Agricultural College.

Fowler Radio Club—Cleveland, Ohio. F. Franklin, 4520, Jewitt Avenue.

Frontier Wireless Club—1034, Elmwood Avenue, Buffalo, N.Y.

Fruitvale Wireless Club—2510, Fruitvale Avenue, Chicago, Ill.

Ft. Wayne Radio Association—Ft. Wayne, Ind. M. Williams.

Fulton-Carlyle Radio Club, The—Cleveland, Ohio. S. Charek.

Glenside Wireless Association—Glenside, Pa. R. Harmer.

Grape Belt Radio Association—Marie Fay. Brockton, N.Y.

Greenwich Interstate Radio Club—Greenwich, Ct. John Barrett, Sec., 64, Lafayette Place.

Hackensack High School Wireless Club—Hackensack, N.J.

Hamilton Radio Association—Hamilton, Ohio. S. Voron.

Hamilton Wireless Association—405, Franklin Street, Hamilton Ohio.

Hamlin Wireless Association—2729, Noble Avenue, Chicago, Ill.

Hardware City Radio Club—New Britain, Conn. N. N. Nelson, 58, Fairview Street.

Hartford Wireless Association—320, Wethersfield Avenue, Hartford, Conn. R. C. Palmer.

Haverhill Wireless Association—Haverhill, Mass.

Hawkeye Radio Association—Ames, Iowa. H. K. Sels, 131, Hyland Avenue.

Hawkeye Radio Association of Iowa—Lamoni, Iowa. A. B. Church, Lamoni.

Hawkeye Radio Association—Toledo, Iowa. R. Batcher.

Helena Wireless Club—Y.M.C.A., Helena, Mont.

Hillsboro Radio Club—Tampa, Fla. S. Boyette, 1047, Green Street.

Hoosier Radio Club—Indianapolis, Ind. N. Watson, 204, Hamilton Avenue.

Hudson City Radio Association—Jersey City, N.J. C. Maves, 90, Ferry Street.

Hudson Valley Wireless Association—Albany, N.Y. Prof. Huested, Albany High School.

Hyde Park High School Radio Club—Chicago, Ill.

Institute of Radio Engineers—1369, Dean Street, Brooklyn, N.Y. David Sarnoff, Sec., 111, Broadway, New York City.

Inter City Radio Association—Berkeley, Calif. J. E. Buckes, Sec., 2108, Parker Street.

Iowa Radio Relay League—Waterloo, Ia. C. Lockwood, 117½, Bridge Street.

Ithaca High School Wireless Club—Ithaca, N.Y.

Junior Radio Club—Pensacola, Fla. Fred Gillmore, 127, W. Gregory Street.

Lane Radio Association—2147, Lincoln Place. Chicago, Ill.

Leigh Wireless Association—Allentown, Pa. A. C. Jacoby, 517, Linden Street.

Lewiston Radio Club—Lewiston, Idaho. G. Eaves.

Long Beach Radio Research Club—Long Beach, Calif.

Los Angeles Radio Association—Los Angeles, Calif. Los Angeles High School—H. Roome, Sec.

Louisville Radio Club—1410, Starks Buildings, Louisville, Ky.

Mahoning Valley Radio League—Niles, Ohio. L. Kovalik, 322, Hunter Street.

Mesa County Wireless League—Y.M.C.A. Grand Junction, Colo.

McGill Wireless Association—Professor C.V. Christie, McGill University, Montreal, Canada.

Miami Wireless Association—Miami, Fla. H. Henshaw, R.F.D.I.

Minnesota Wireless Association—Minneapolis, Minn.

Mountain States Radio Association—Denver, Colo. C. Newmann, 1523, So. Ogden Street.

National Amateur Wireless Association—450, Fourth Avenue, New York City. Guglielmo Marconi, Pres.

Nebraska Radio Association—Lincoln, Nebr. A. T. Stratton 1449. " S " Street.

New England Wireless Association—125, Milk Street, Room 99, Boston, Mass.

New Haven Wireless Association—27, Vernon Street, New Haven, Conn.

New London Radio Club—New London, Conn. P. Tilden, 23, Williams Street.

Norfolk Radio Society—Norfolk, Va. J. Ross, c/o Gun Storekeeper, U.S. Navy Yard.

Norristown Radio Club—Main Street and Franklin Avenue. D. Walker, 552, Kohn Street.

Nyack Y.M.C.A. Radio Club—Nyack, N.Y. M. E. Robertson, 98, Piermont Avenue.

Oakland Wireless Club—Oakland, Calif—916, Chester Street.

Oklahoma Radio Experimental Association—Oklahoma City, Okla. C. Smith, 922½, W. Main Street.

Oregon State Wireless Association—348, William Street, Portland, Oregon. E. L. Bischoff, Sec.

Pacific States Wireless Association—Los Angeles, Calif. 288, Wilcox Avenue.

Pacific Wireless Club of Oregon—405, East Market Street, Portland, Oregon.

Pasadena Radio Association—Passadena, Calif. Sec. C. W. Patton, 195, N. Hill Avenue.

Pittsburgh Wireless Association—6031, Kirkwood Street, Pittsburgh, Pa.

Pomona Wireless Club—Pomona, Calif. Sec. H. Gates.

Port Huron Radio Club—Port Huron, Mich. C. Thompson, 815, Wall Street.

Portland Radio Club—13, Forest Avenue, Portland, Me. C. T. Beardsley.

Port Townsend Radio Club—Port Townsend, Wash. G. Hunter, 518, Willow Street.

Power City Wireless Association—Niagara Falls, N.Y.

Puget Sound Wireless Association—Seattle, Wash. V. Kraft, 6519, 19th Avenue, N.E.

Radio Association of Md.—Arlington, Md. Bancroft Park. R. Dimling, Sec.

Radio Club of Hartford—Hartford, Conn. M. Steele, 1202, Park Street, W. Hartford.

Radio Club—Irvington, N.J. A. Oechler, 82, Smith Street.

Radio Club of Framingham—Framingham, Mass. J. L. Reynolds 135, Vanderbilt Hall, Sheffield Scientific School, New Haven, Ct.

Radio Club of Redlands—Redlands, Calif, 108, Eleventh Street. H. Williamson.

Radio Club of Thomson—Thomson, Ga. C. Morris, 104, W. Hull Street.

Radio Club of Flint—Flint, Mich. I. Carr, 426, Roosevelt Avenue.

Radio Club, Y.M.C.A.—Trenton, N.J. H. Atkinson, Sec.

Radio Club of New Rochelle—New Rochelle, N.Y. T. Harvard, 48, John Street.

Radio Club of Union College—Schenectady, N.Y.

Radio Club of Port Richmond—Port Richmond, S.I. H. E. Ballentine, 17, Sharp Avenue.

Radio Council—So. Gary, Ind., 200, W. Ridge Road. W. Blaemire.

Radio Research Society of Mt. Vernon—Mt. Vernon, N.Y. W. Morgan, 149, Urfan Street.

Rogers High School Radio Club—Newport, R.I. C. N. Clarkson, 17, Gibbs Avenue.

Rochester Wireless Association—Rochester, N.Y. C. Stand.

Sacramento Radio Club—Sacramento, Calif. Sec. R. Coover, 1613, 19th Street.

Sacramento Wireless Signal Club—Sacramento, Calif. 2119, H. Street.

St. Paul Wireless Club—184, Walnut Avenue, Santa Cruz, Calif.

St. Petersburg Wireless Association—St. Petersburg, Pla. C. C. Allen, Big Bayou.

St. Louis Radio Club—3817, Olive Street, St. Louis, Mo. H. Blatterman.

San Francisco Radio Club—San Francisco, Cal., 350, Frederick Street. H. Lee, 1580, Grove Street.

Scott High Radio Club—Scott High School, Toledo, Ohio. W. K. King, Pres.

Senn Radio Association—Senn High School, Chicago, Ill.

Society of Radio Research—Atlanta, Ga. A. B. Cory, 379, N. Jackson Street.

Southern Wireless Association—1435, Henry Clay Avenue, New Orleans, La.

South Side High School—Newark, N.J. H. Wersfelder.

Springfield Wireless Association—323, King Street, Springfield, Mass.

Spring Hill Amateur Wireless Association—2, Benton Road, Somerville, Mass.

Suburban Radio Club—Washington, D.C. C. Longfellow, Jr. 5515, Potomac Avenue.

Sylvan Engineers—Sylvan Grove, Kans. G. C. Hitchcock, Sylvan Grove.

Technical Wireless Association—E. L. Powell. 216, Spruce Avenue, Takoma Park, Md.

Technical Wireless Association—1206, E. Capitol Street, Washington, D.C.

Texas Wireless Association—1212, Prairie Avenue, Houston, Tex.

Toledo Wireless Club—1024, Erie Street, Toledo, Ohio.

Topeka Radio Club—Topeka, Kansas. R. L. Morehouse, Hyland Park.

Tri-State Wireless Association—Memphis, Tenn. C. De La Hunt, Pres., 346, Winchester Avenue.

Troop 28 Boy Scouts—Epworth M.E. Church. 121, Nash Street, Hartford, Conn.

"Two Hundred Meter Radio Club of Newton"—A. M. Hunt, Madison Avenue, Newtonville, Mass.

Union County Radio Association—Roselle Park, N.J. 137, Westfield Avenue, R. E. Timbrook.

United Wireless Relay Club—Passaic, N.J., 102, High Street.

Waco High School Radio Club—Waco, Tex. P. Deeby, 535, Proctor Avenue.

Washington Wireless Club—Trenton, N.J. M. Pillsbury, Washington Market.

Waterbury Wireless Association—Waterbury, Conn., 26, London Street.

Welcome Wireless Association—185, Chauncey Street, Brooklyn, N.Y.

Western Wireless Union of America—A. C. Cameron, 19, S. Fifth Avenue, Chicago, Ill., U.S.A.

Wichita Wireless Association—Butts Building. C. V. Williams, 525, N. Emporia Avenue.

Wildwood Radio Association—Wildwood, N.J. L. Chalmers, 125, Burk Avenue.

Wireless Association of Atlantic City—Atlantic City, N.J. C. Cramer, 11, States Avenue.

Wireless Association of Central Calif—Fresno, Calif. 860, Callish Street.

Wireless Association of Central Pa.—409, Kelker Street, Harrisburg, Pa.

Wireless Association of Greater Ft. Smith—Greater Ft. Smith, Ark.

Wireless Association of Keene—172, Elm Street, Keene, N.H.

Wireless Association of Milwaukee—824, Nineteenth Avenue, Milwaukee, Wisc.

Wireless Association of Montana—309, South Ohio Street, Butte, Mont.

Wireless Association of New England—Filene Building, Boston, Mass. H. Hill.

Wireless Association of New Orleans—New Orleans, La., 2022 State Street.

Wireless Association of Penna—Odd Fellow Temple, Phila., Pa.

Wireless Association of Savannah—Savannah, Ga, 303, Price Street.

Wireless Association of So. Calif—Los Angeles, Calif, 935, Denver Avenue.

Wireless Association of Tuft's College—Medford, Mass.

Wireless Club of Montclair Academy—Montclair, N.J. H. Warner, Gt. Notch, N.J.

Wireless Club of Y.M.C.A.—Gloucester, Mass. F. Essig, Y.M.C.A.

Wireless Relay Club—Jacksonville, Fla. E. Peer, 419, West Duval Street.

Wireless Society of Springfield—Box 562, Springfield, Mass.

Y.M.C.A. Wireless Club—Williamsport, Pa., 211, West Fourth Street.

Young Edison Society—Rogers, Ark.

Young Marconi's Wireless Association—P. H. Bolton, 1024, Erie Street, Youngstown, Ohio.

Youngstown Radio Club—Youngstown, O.—P. Brenner, 516, Plum Street.

CODE SIGNALS

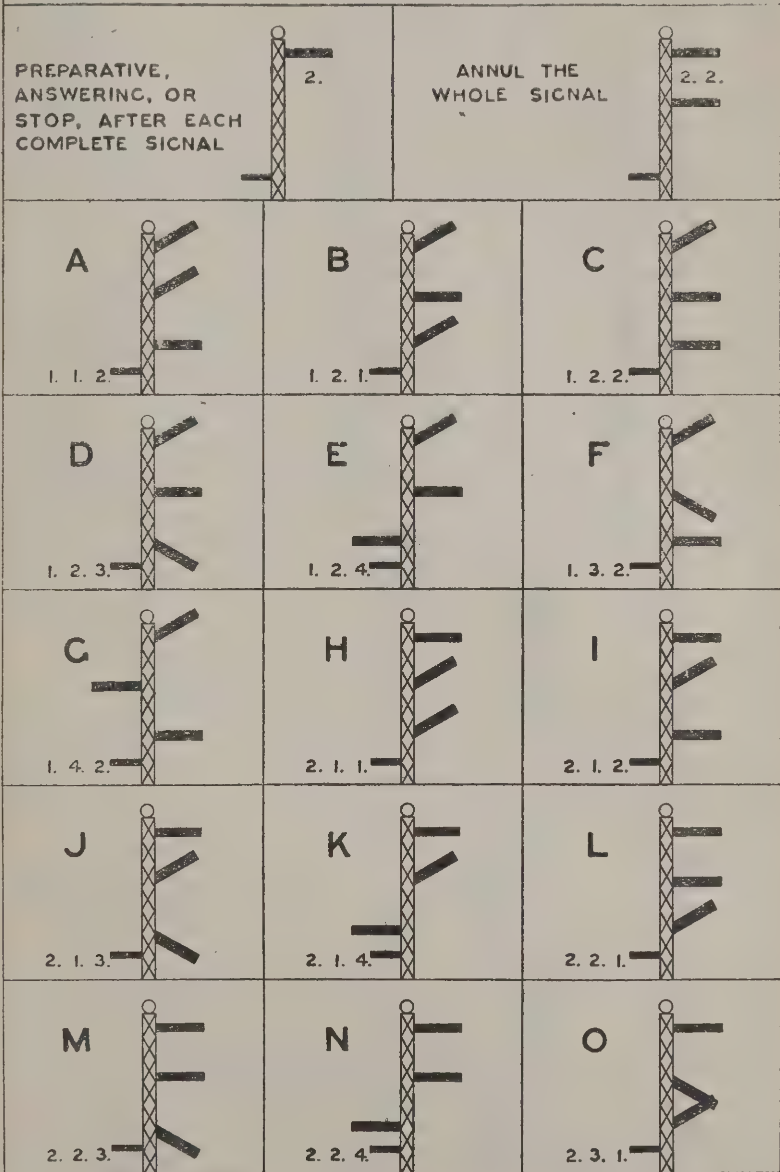
In the following pages are shown general alphabetical tables for making international code signals by means of the fixed semaphore, and signals by means of the British movable semaphore. Through the courtesy of Messrs. James Brown and Son, Glasgow, we are able to reproduce from "Brown's Signalling" tables showing the British method of semaphoring by hand flags. In the British method, the person intending to semaphore makes the international code signal V O X, "I am going to semaphore to you," and sets his semaphore at the alphabetical signal, with the indicator out, and waits until the ship to which the semaphore signal is to be made hoists her answering pennant "close up." Then he will proceed with the communication by spelling, making a momentary pause between each sign or letter; the arms are to be dropped between each word or group, the indicator only remaining out.

Should the answering pennant be dipped by the person taking in the signal, the last *two* words are to be repeated until the answering pennant is again hoisted "close up," which denotes that the person taking in the semaphore signal is ready to read and write down the signal. It is to be dipped when a word is lost, and the person making the signal is then to repeat the *two* last words until the answering pennant is hoisted again "close up."

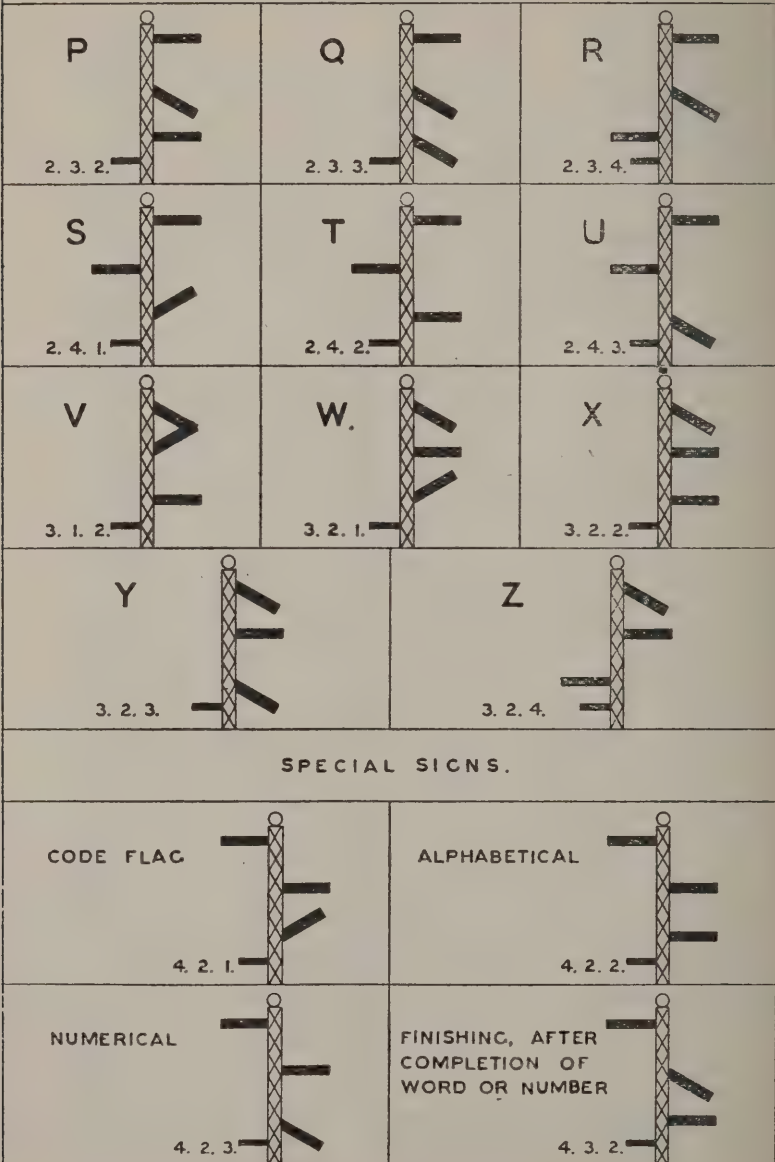
The British method of semaphoring by flags held in the hand which is shown is exactly the same as the British movable semaphore system, the positions of the apparatus which denote the letters, numbers, and special signs being identical in each case, the only difference being in the apparatus employed.

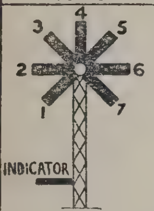
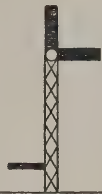
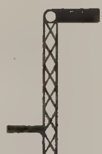
The French method of semaphoring by hand flags is based on the same principle as the British method, but the positions in which the flags are held to denote the letters, etc., are different.

GENERAL ALPHABETICAL TABLE FOR MAKING THE INTERNATIONAL CODE SIGNALS BY MEANS OF DISTANT SIGNALS BY FIXED SEMAPHORE.

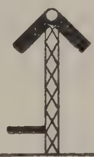
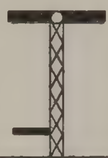
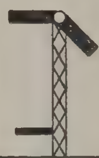


GENERAL ALPHABETICAL TABLE FOR MAKING THE INTERNATIONAL CODE SIGNALS BY MEANS OF DISTANT SIGNALS BY FIXED SEMAPHORE.

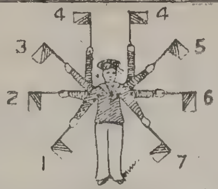


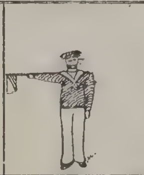
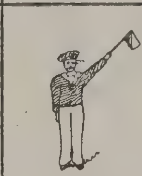
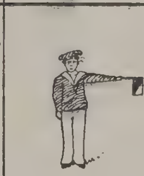
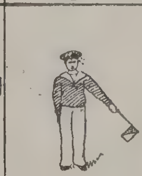
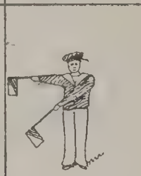
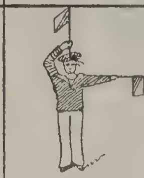
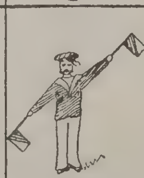
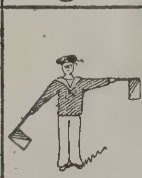
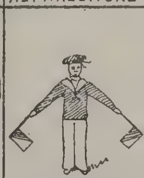
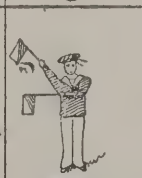
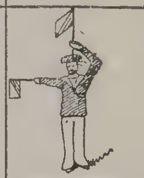
SEMAPHORE SIGNS	COVERING SIGNS			
	FULL STOP A·A·A 			
	REPEATED THREE TIMES IN QUICK SUCCESSION	ALPHABETICAL	NUMERICAL	ANNUL OR NEGATIVE
SIGN				
ALPHABETICAL	A	B	C	D
NUMERICAL	1	2	3	4
SIGN				
ALPHABETICAL	E	F	G	H
NUMERICAL	5	6	7	8
SIGN				
ALPHABETICAL	I	J	K	L
NUMERICAL	9	ALSO ALPHABETICAL	0	

NOTE.— IF A NUMERICAL SIGNAL IS TO BE FOLLOWED BY WORDS, THE END OF THE NUMERICAL SIGNIFICATION OF THE SIGNS IS SHOWN BY THE ALPHABETICAL SIGN BEING MADE, INDICATING THAT SPELLING IS AGAIN TO COMMENCE.

SIGN				
ALPHABETICAL	M	N	O	P
SIGN				
ALPHABETICAL	Q	R	S	T
SIGN				
ALPHABETICAL	U	V	W	X
SIGN				
ALPHABETICAL	Y	Z		

NOTE.— IF A NUMERICAL SIGNAL IS TO BE FOLLOWED BY WORDS, THE END OF THE NUMERICAL SIGNIFICATION OF THE SIGNS IS SHOWN BY THE ALPHABETICAL SIGN BEING MADE, INDICATING THAT SPELLING IS AGAIN TO COMMENCE.



SIGN				
ALPHABETICAL	A	B	C	D
NUMERICAL	1	2	3	4
SIGN				
ALPHABETICAL	E	F	G	H
NUMERICAL	5	6	7	8
SIGN				
ALPHABETICAL	I	J	K	L
NUMERICAL	9	ALSO THE ALPHABETICAL	O	
SIGN				
ALPHABETICAL	M	N	O	P

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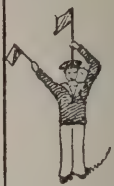
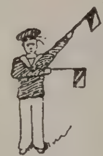
SIGN				
ALPHABETICAL	Q	R	S	T
SIGN				
ALPHABETICAL	U	V	W	X

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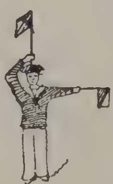
ALPHABETICAL	Y	Z

SIGN			
	ALPHABETICAL	NUMERICAL	ANNUL

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LLOYD'S SIGNAL STATIONS.

THE Society of Lloyd's, incorporated by Act of the British Parliament and the Royal Assent of Her late Majesty Queen Victoria, has, with the sanction of Parliament, the control and working of Signal Stations in Great Britain and Ireland and in many places abroad. Various foreign Governments have also recognised the advantage of reports from signal stations and semaphores being universally collected and forwarded on identical conditions. These have arranged that reports from or to their semaphores can be obtained or forwarded through Lloyd's.

Thus one universal system of receiving and transmitting maritime reports extends over a wide area. The organisation of signal stations is made very favourable for shipowners and merchants, and the commerce of the world in general. If, for instance, a shipowner, charterer, or consignee wishes to transmit an order to any vessel at any point where she may appear, one communication to Lloyd's is sufficient to ensure the message being given at any or all of these stations as may be desired.

The charges for forwarding information from, or transmitting advices by means of signal stations are moderate. Shipowners, charterers, merchants, or consignees can obtain telegraphic intelligence at small cost with regard to any vessel in which they may be interested, or postal advices if so preferred, or can transmit orders to such vessels by merely communicating with the Secretary of Lloyd's.

Harbour and Dock Authorities, Chambers of Commerce, Exchanges, and such institutions as may require a large number of reports can arrange with Lloyd's for receiving full and regular advices from Lloyd's Signal Stations on reduced terms, for, when a number of reports are taken, a substantial reduction is made in the signalling fees. Shipowners or others who wish to be supplied with reports of vessels from any signal stations are requested to communicate with the Secretary of Lloyd's, London, E.C.

The following is a list of signal stations at which signals are received from and made to merchant vessels of all nations :

UNITED KINGDOM.

Southend (A)
*†Dover (L)
‡Sandgate (A)
*†Dungeness (A)
*†Beachy Head (A)
*†Horse Sand Fort (Spithead) (S)
*†St. Catherine's Point (I.W.) (L)
Needles (I.W.) (A)
Portland Bill (L)
‡Berry Head (Brixham) (A)
*†Prawle Point (L)
*†The Lizard (L)
Penzance (S)
Scilly Islands (L)
Lundy Island (L)
*†Barry Island (A)
St. Ann's Head (Milford Haven) (A)
The Smalls (S)
Tuskar Rock (S)
Templebreedy (A)
*†Old Head of Kinsale (L)
*†Fastnet (S)
*†Brow Head (L)
Inishtrahull (L)
Torr Head (A)
*†Kildonan (Mouth of the Clyde) (L)
‡Lamlash (Mouth of the Clyde) (A)
Butt of Lewis (Hebrides) (L)
Cape Wrath (L)
Dunnet Head (Pentland Firth) (L)
St. Abb's Head (L)
*Tynemouth (L) (Hailing Station)
*†Flamborough Head (A)
Spurn Head (L)
Haisbro' Lightship (S)
Aldeburgh (A)

(L) Stations belonging to Lloyd's.

(A) Stations belonging to the Lords Commissioners of the Admiralty, but signalling is conducted at them on behalf of Lloyd's.

(S) At these stations special arrangements have been made for signalling being conducted for Lloyd's.

(*) At these stations arrangements have been made for night-watch to be kept in order to take in pyrotechnic night signals made by passing vessels whose owners have such private night signals registered by the Board of Trade. The signal to intimate that a vessel's pyrotechnic night signal has been seen and recognised is a red flare light of 30 seconds' duration.

(†) At these stations arrangements have also been made to take in, in addition to the above pyrotechnic night signals, any messages made at night by means of a flashing lamp in accordance with the Morse code as laid down in the International Code of Signals Book. Messages may be transmitted from these stations to vessels by flashing lamp in the same manner.

(‡) At these stations communication is restricted to vessels sheltering through stress of weather.

N.B.—The Fastnet and Inishtrahull stations are connected with the mainland by wireless telegraphy.

ABROAD.

EUROPE (West Coast).

FAERDER OXO	These stations are the property of, and are managed by, the Government of His Majesty the King of Norway.

VINGA (Gothenburg). This station is the property of, and is managed by, the Government of His Majesty the King of Sweden.

HELSINGBORG

ELSINORE HAMMERSHUUS FORNAES SKAGEN HIRTSHALS HANSTHOLM	These stations are the property of, and are managed by, the Government of His Majesty the King of Denmark.

FLUSHING (Lloyd's)

ZEEBRUGGE (Bruges Port de Mer) (Lloyd's). (Temporarily suspended.)

GRIS NEZ USHANT CREACH	These stations are the property of the Government of the French Republic.

CAPE FINISTERRE. This station is the property of the Government of His Majesty the King of Spain.

PENICHE (Cape Carvoeiro) OITAVOS SAGRES (Cape St. Vincent)	These stations are the property of the Government of Portugal.

TARIFA. This station is the property of the Government of His Majesty the King of Spain.

MEDITERRANEAN.

*†GIBRALTAR (Admiralty Signal Station, Windmill Hill).

*†CAPE SPARTEL (Lloyd's).

POMEGUES (Marseilles) CAPE CORSE (Corsica) CAPE PERTUSATO (Corsica)	These stations are the property of the Government of the French Republic.
CAPO TESTA (Straits of Bonifacio) CAPO D'ARMI (Straits of Messina) FORTE SPURIA (Straits of Messina) PANTELLARIA ISLAND	These stations are the property of the Government of His Majesty the King of Italy.

MALTA (Lloyd's)

CAPE BON (Tunis). This station is the property of the Government of the French Republic.

PORT SAID (Wireless Telegraphy) (Lloyd's).

AFRICA (West Coast).

*†CAPE SPARTEL (Lloyd's).

PONTA FERRARIA PONTA DO ARNEL	St. Michael's, Azores.

Capellinhos Point (Fayal, Azores).
Madeira.
Teneriffe.
Las Palmas (Grand Canary).
St. Vincent (Cape Verde Islands).
Ascension.
St. Helena (Ladder Hill).

CAPE COLONY.

Cape Point Cape L'Agulhas Cape St. Francis Cape Recife	These stations are the property of the Government of Cape Colony.

AFRICA (East Coast).

*†Bluff (Port Natal).
Port Louis Mountain (Mauritius).

RED SEA AND INDIAN OCEAN.

Port Said (Wireless Telegraphy) (Lloyd's).
*†Perim (Lloyd's).
Aden.

Jask Henjam Reshire (Bushire)	Persian Gulf	These stations are controlled by the Indo-European Telegraph Department.

*†Point de Galle. This station is the property of the Colonial Government of Ceylon.

Sandheads (River Hooghly). Lloyd's Agents at Calcutta have facilities for delivering orders.

False Point (Bay of Bengal).

Saugor Island Mud Point Diamond Harbour Hooghly Point Achipur Budge Budge	River Hooghly.
Elephant Point Diamond Island Amherst	Burmah.

The above ten coast telegraph offices are the property of the Indian Telegraph Department.

*†Sabang Bay (Pulo Weh, N. Sumatra).

Penang Malacca ‡Mount Faber (Singapore) ‡Fort Canning (Singapore)	These stations are the property of, and are controlled by, the Colonial Government of the Straits Settlements.

Anjer (Sunda Straits).

Cape St. James (Saigon) This station is the property of the Government of Cochin China.

* † ‡ *For footnote references see page* lxxxvii.

AUSTRALASIA.

*†Rottnest Island (W. Australia)
*†Fremantle (Arthur's Head)

These stations are the pilot signal stations for the Port of Fremantle, and are controlled by the Fremantle Harbour Trust.

*†Point Moore
*†Cape Naturaliste
*†Breaksea Island
*†Cape Borda
Cape Willoughby
Cape Jervis
*†Cape Northumberland
*†Cape Nelson
*†Cape Otway
*†Point Lonsdale
*†Cape Schanck
*†Wilson's Promontory
*†Gabo Island

These stations are the property of the Government of the Commonwealth of Australia, and are controlled by the Commonwealth Lighthouse Service.

Queenscliffe This station is the property of the Government of Victoria, and is controlled by the Department of Ports and Harbours, Victoria.

*†Goode Island (Torres Straits). This station is the property of the Government of the Commonwealth of Australia, and is controlled by the Commonwealth Lighthouse Service.

Tasmania:
Table Cape
Mersey Bluff
Low Head
Eddystone Point
Cape Sorell
Curry Harbour (King Island)
Bruni
Kent Group

These stations are the property of the Government of the Commonwealth of Australia, and are controlled by the Commonwealth Lighthouse Service.

Cape Maria Van Diemen (N.Z.)
Farewell Spit (N.Z.)
Nugget Point (N.Z.)

These stations are the property of the Government of New Zealand.

Bluff Harbour (N.Z.). This station is the property of, and is controlled by, the Bluff Harbour Board.

(*) At these stations arrangements have been made to take pyrotechnic night signals.

(†) At these stations arrangements have also been made to take in, in addition to the above pyrotechnic night signals, any messages made at night by means of a flashing lamp in accordance with the Morse code, as laid down in the International Code of Signals Book. Messages may be transmitted from these stations to vessels by flashing lamp in the same manner.

(‡) Singapore.—At these stations day watch only is kept, but if it is desired to keep watch for a vessel with a view to delivering orders during the night the aid of the Singapore Pilots Association's launch can be obtained. The charge for this launch at night time is $5 per hour. It is desirable that owners should state always when a vessel is due to arrive for orders and also whether the vessel will wait until daylight to obtain her orders, or whether the Pilots Association's launch is to be utilised.

PACIFIC ISLANDS.

NORFOLK ISLAND.
FANNING ISLAND. This station is the property of the Pacific Cable Board.

SOUTH AMERICA.

POINT CURAUMILLA (Valparaiso)
POINT TUMBES (Talcahuano)
CAPE DUNGENESS (Straits of Magellan)
These stations are the property of the Government of the Republic of Chile.

CAPE VERGENES (Straits of Magellan)
PENGUIN ISLAND
MOGOTES POINT
CAPE SAN ANTONIO
These stations are the property of the Government of the Argentine Republic.

*†MONTEVIDEO
FLORES ISLAND
PUNTA DEL ESTE (Maldonado).
These stations are the property of the Government of the Republic of Uruguay.

FERNANDO NORONHA. This station is the property of the South American Cable Co.

WEST INDIES AND BERMUDA.

CURAÇAO (Willemstad). This station is the property of, and is controlled by, the Colonial Government of Curaçao.

MONK'S HILL (Antigua). This station is the property of the Colonial Government of Antigua.

TURK'S ISLAND (Lloyd's).

GIBB'S HILL
FORT GEORGE
Bermuda.

NORTH AMERICA.

SAND KEY (Florida Reef).

ST. LAWRENCE.—The following signal stations are maintained by the Government of Canada. Orders forwarded to Lloyd's can be transmitted to vessels by means of these signal stations on the same conditions as through Lloyd's Signal Stations. Vessels signalling to these signal stations will be reported to Lloyd's in the same manner as if signalled from Lloyd's Signal Stations :—

BELLE ISLE (Labrador)
CAPE RACE (Newfoundland)
CAPE RAY (Newfoundland)
ST. PAUL'S ISLAND (Cape Breton)
AMHERST ISLAND (Magdalen Islands)

HEATH POINT
SOUTH POINT
SOUTH-WEST POINT
WEST POINT
Anticosti

CAPE ROSIER
FAME POINT
CAPE MAGDALEN
FATHER POINT
Canada

* † *For footnote references see page* lxxxvii

WIRELESS STATIONS.

All Wireless Shore Stations which have been established in the United Kingdom for ship to shore communication have been taken over by the General Post Office, but Lloyd's receives information from these Post Office Stations in regard to the position and movements of ships and other maritime intelligence.

GALES.

The Meteorological Office sends to the signal stations at St. Catherine's Point, Horse Sand Fort, Prawle Point, the Lizard, Lundy Island. Flamborough Head, St. Abb's Head, Dunnet Head, Brow Head, and Old Head of Kinsale telegrams announcing atmospheric disturbances near the coasts of the British Islands. The fact that one of these notices has been received at any station is made known by hoisting a cone three feet high and three feet wide at base, which appears as a triangle when hoisted. The cone is kept hoisted until dusk and then lowered, but is hoisted again at daylight next morning.

Southerly Gale—The South Cone (*point downwards*) is hoisted for gales and strong winds from S.E., veering to S.W., W., or N.W.; from S.W., veering to W. or N.W.; from W., veering to N.W.; and also from E. veering to S. or S.W.

Northerly Gale.—The North Cone (*point upwards*) is hoisted for gales and strong winds from S.E., E., or N.E., backing to N.; from N.W., veering to N., N.E., or E.; from N., veering to N.E. or E.; from N.E., veering to E.

THE MORSE CODE.

The Morse code as used by all countries except America is called the "Continental Morse," and is a dot and dash system throughout, with a maximum of four elements in any letter; an element is either a dot or a dash.

Whatever the speed at which signals are sent, the following rules must be remembered and strictly adhered to:

A dash is equal in length to three dots.

A space between two elements in a letter is equal in length to one dot.

The space between letters in a word is equal in length to a dash.

The space between words in a sentence is equal in length to two dashes.

The European or Continental Morse Code.

a	- —	m	— —	z	— — - -
ä	- — - —	n	— -		
á or å	- — — - —	ñ	— — - — —		Numerals.
b	— - - -	o	— — —	1	- — — — —
c	— - — -	ö	— — — -	2	- - — — —
ch	— — — —	p	- — — -	3	- - - — —
d	— - -	q	— — - —	4	- - - - —
e	-	r	- — -	5	- - - - -
é	- - — - -	s	- - -	6	— - - - -
f	- - — -	t	—	7	— — - - -
g	— — -	u	- - —	8	— — — - -
h	- - - -	ü	- - — —	9	— — — — -
i	- -	v	- - - —	0	— — — — —
j	- — — —	w	- — —	.	- - - - - -
k	— - —	x	— - - —	?	- - — — - -
l	- — - -	y	— - — —	!	— — - - — —

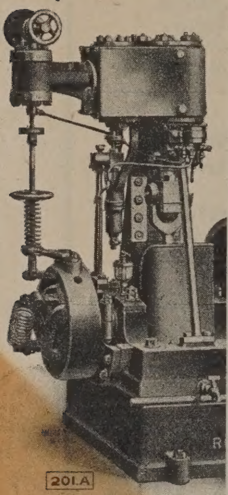
American Morse Code.

A	- —	N	— -		Numerals.
B	— - - -	O	- -	1	- — — -
C	- - -	P	- - - - -	2	- - — - -
D	— - -	Q	- - — -	3	- - - — -
E	-	R	- - -	4	- - - - —
F	- — -	S	- - -	5	— — —
G	— — -	T	—	6	- - - - - -
H	- - - -	U	- - —	7	— — - -
I	- -	V	- - - —	8	— - - - -
J	— - — -	W	- — —	9	— - - —
K	— - —	X	- — - -	0	— - - - - —
L	——	Y	- - - -	.	- - — — - -
M	— —	Z	- - - -	?	— - - — -
				!	— — — -


150
R I A
R E
60
Viborg
Okhotsk
Nicolaiewsk RNL
Kerbinskaia
Nicolaiewsk RAU

ROBEY & CO., Ltd.

and 79



Makers
class En
Refriger
Plants,
Oil Eng
Air Con
Boilers.

Wri
Illustrated